ENGINEERING NEWS-RECORD

Ohio's Preston mechanizes the drudgery (p. 37)

E S POWER GS
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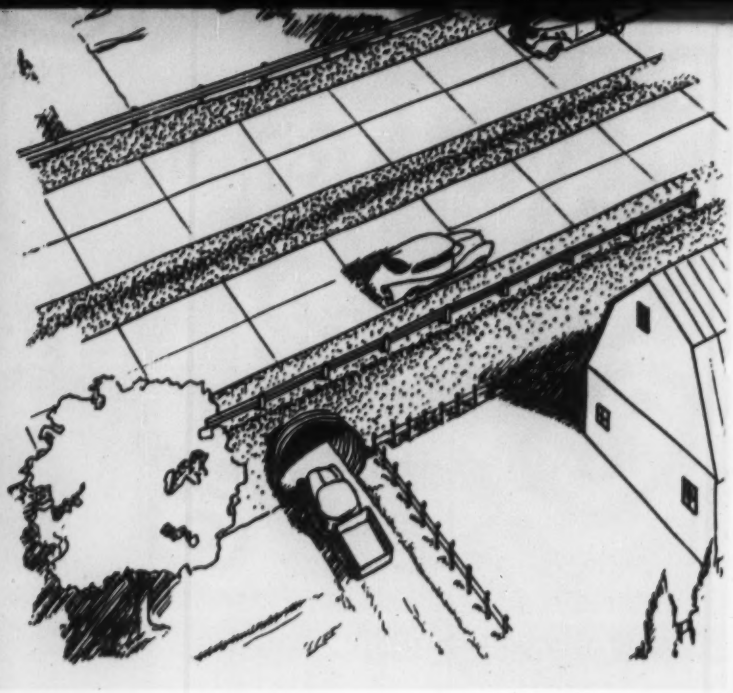
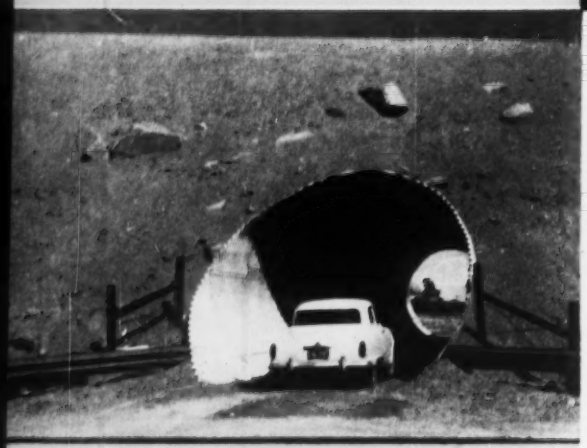
A McGRAW-HILL PUBLICATION

Versatile Armco MULTI-PLATE Provides Economical Underpasses at Limited Access Highways





Typical installation of an Armco MULTI-PLATE Underpass. Beveled end requires no headwall or other finishing.

A MULTI-PLATE Pipe-Arch has been used here to replace a narrow, worn-out bridge under a county road in Texas.

What should be done when limited access highways cross county or farm roads? The economical solution is standard Armco MULTI-PLATE® Underpasses for the secondary roads.

These field-assembled corrugated metal structures, designed expressly for this application, are available for prompt delivery. And they may be installed immediately upon arrival.

ENGINEERS find MULTI-PLATE Underpass provides an attractive structure that blends with the side slope. The service-proved prefabricated design conserves valuable engineering time.

CONTRACTORS approve because there is a minimum of costly idle time for heavy equipment, less delay for grading. They can take better advantage of good weather; and jobs are completed faster.

Armco MULTI-PLATE Underpasses are supplied to conform to the side slope in a range of shapes, sizes and gages.

This is just one example of the way more than 30 Armco drainage and construction products can help you solve today's problems. Armco MULTI-PLATE is also widely used for drainage structures in highway, railway, municipal and industrial installations. Write for complete data. Armco Drainage & Metal Products, Inc., 4157 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

ARMCO

CONSTRUCTION PRODUCTS

VERSATILITY . . . HIGH PRODUCTION

. . . all in one low-cost team

Here it is—the Allis-Chalmers HD-6 crawler tractor (63 belt hp) and the Model 44 scraper (4 yd struck, 4.7 yd heaped). This self-loading combination is a natural for many contractors . . . big enough to move dirt fast, small enough to leave room for profit on low-yardage jobs.

In addition to low first cost, the HD-6 has dozens of features that help keep operating costs down . . . including, 1,000-hour lube intervals for truck wheels, idlers and support rollers.

Full hydraulic control speeds jobs, simplifies operator's work. And the Model 44 scraper has these important big-scraper advantages: high apron lift, forced ejection, wide cutting edge, high flotation tires and ample clearance.

For all the facts on this low-cost tractor-scraper combination, see your nearby Allis-Chalmers construction machinery dealer now. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

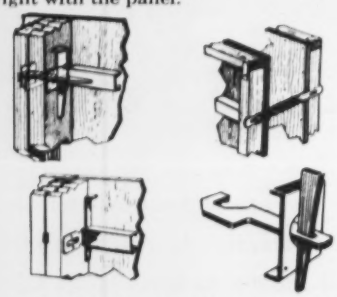
ALLIS-CHALMERS *Engineering in Action*

"We wanted wall pours that we could complete fast, with forms we could re-use. That's...

...Why We Bought WACO Forms"

"All concrete forms are quite similar in construction and application," points out Harry Langlois, general superintendent for the Langlois Construction Company of La Grange, Illinois. "We found, however, that Waco forms had certain features we liked."

"For one thing," he explains, "Waco forms have fewer parts to get lost or misplaced. In fact," Langlois adds, "Waco forms have only these four basic elements in addition to the form itself, which comes in a variety of sizes to meet every forming need. First—there's a one-piece wedge-bolt, that serves as both a wedge and a bolt, for tieing the forms together. Then—a one-piece waler, for fast, easy waler attachment. Next—flat bar wall ties are self-aligning . . . the extended ends show at a glance the locations of the ties before pouring. And finally—spring retainers in the panel reinforcing sections hold a complete set of Waco wedge-bolts right with the panel."



"We like the way Waco forms stand up for an above-average number of pours, too," Langlois continues. "We've used our Waco forms now for the eighth time, and we're more sold on Waco than ever. I suggest that when *you* need forms to rent or buy, you get in touch with your nearby Waco form distributor."

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EIGHTY-THIRD YEAR OF PUBLICATION

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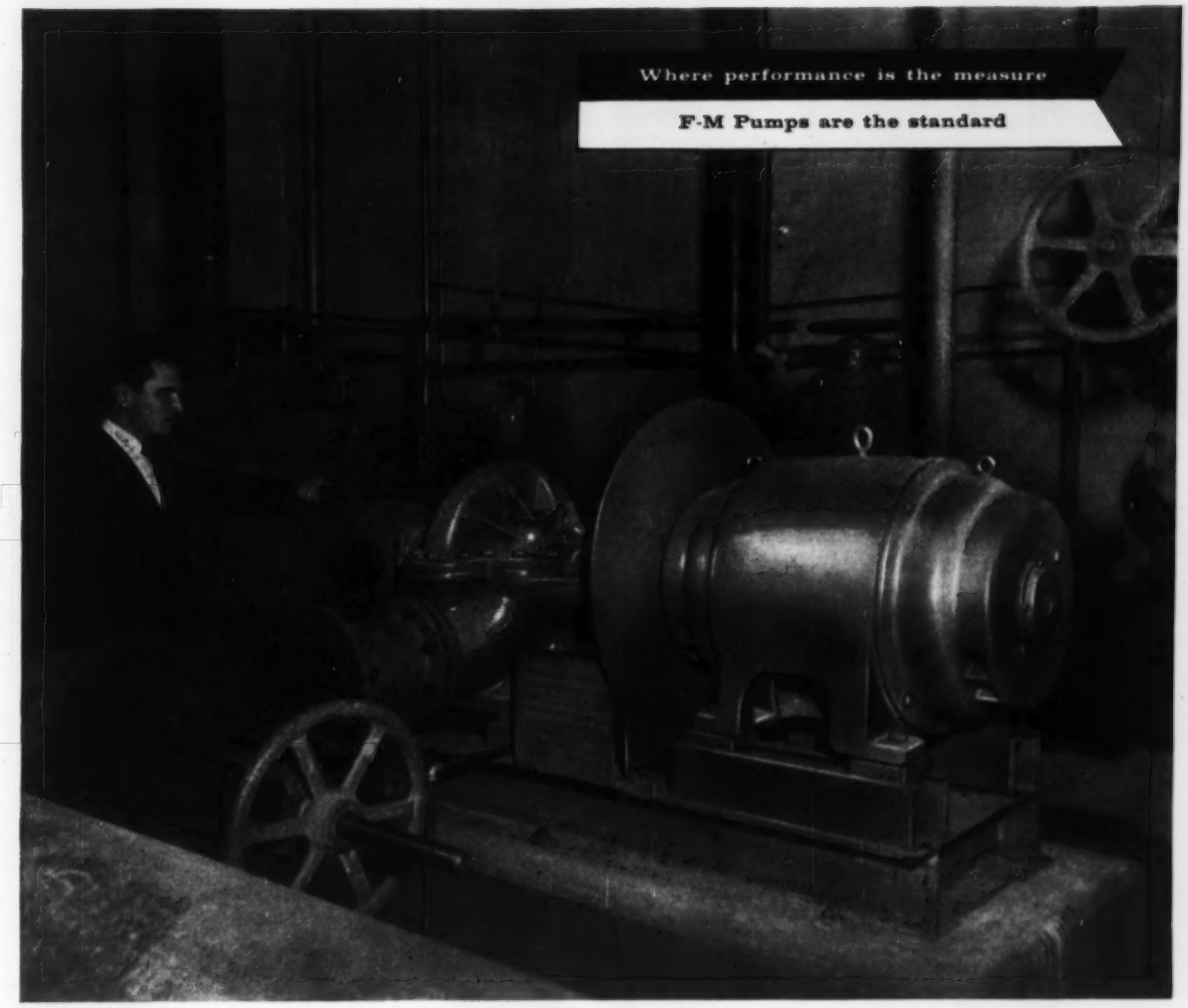

Fairbanks-Morse 6" dual-driven fire pump in jet engine testing laboratory.

Standby against 3500 degrees!

Full power testing of Navy jet engines creates exhaust heat up to 3500° F. a few feet from highly inflammable fuel—a constant fire hazard when in the confines of the testing laboratory.

To insure positive protection against fire losses, Thompson Products Gas Turbine Laboratory, Perry, Ohio, has installed a sprinkling system with a Fairbanks-Morse 6" dual-driven fire pump—capable of pumping 1500 gallons per minute. The installation is so dependable, so positive that prompt approval was given by the authorities having jurisdiction.

Don't gamble with the heart of your fire-prevention equipment; insist on F-M pumps with F-M power. See your F-M Field Engineer for expert assistance, or write Fairbanks, Morse & Co., Department CEP-3, 600 South Michigan Avenue, Chicago 5, Illinois.

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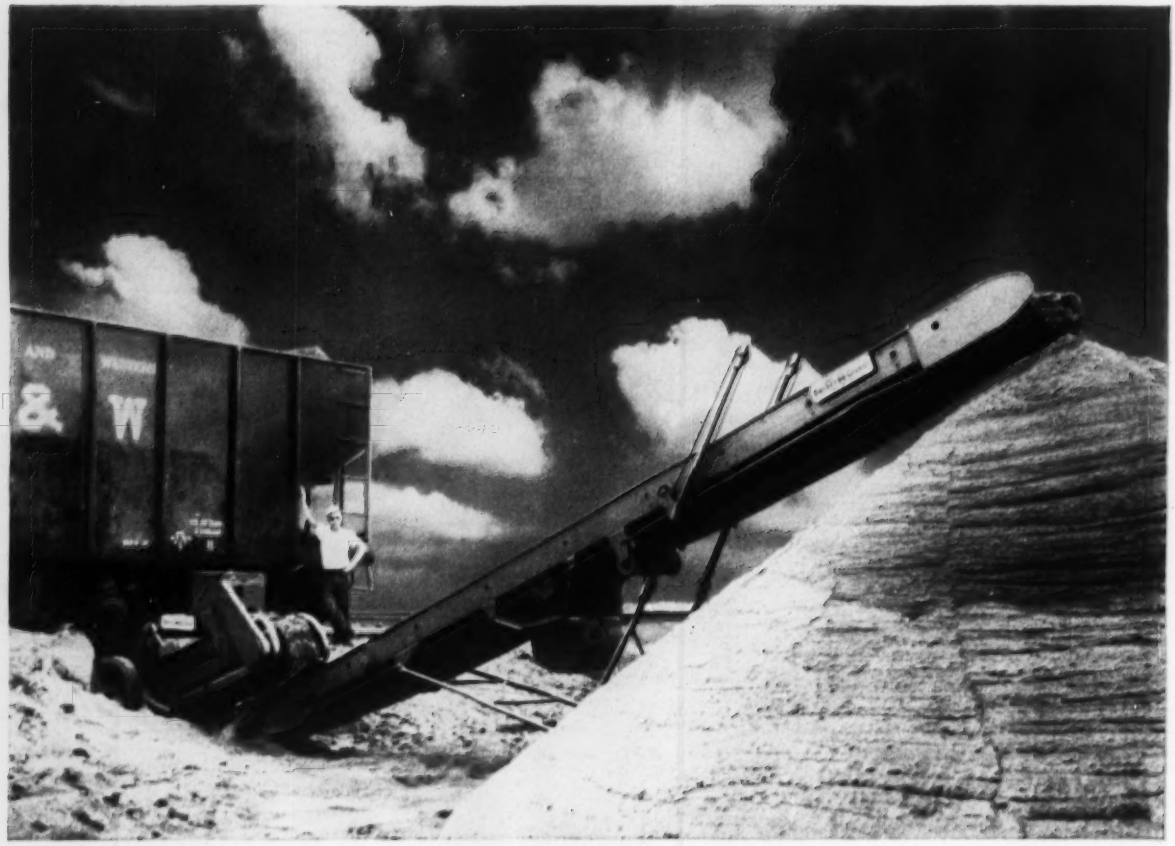


Ohio contracting firm, S. E. Johnson Co., reports:

"We unload the largest hopper cars in 45 minutes"

"Our Barber-Greene unloader and conveyor easily handle 800 tons a day with just intermittent operation. So far, we have moved over 85,000 tons of material and have had no maintenance expense to speak of."

This statement isn't a manufacturer's specification; it is a factual, unvarnished, report typical of the many comments on outstanding performance of Barber-Greene car-unloading equipment.

Wherever it's used, the combination of the 363 Portable Conveyor and the 358 Car Unloader provides a sure way to cut unloading costs and to release cranes and other, more expensive equipment for more efficient operation on other jobs. Whatever these Barber-Greenes handle—coal, sand, gravel or other bulk materials —they do the job virtually automatically as a one-man operation.

Both conveyor and unloader are mounted on pneumatic tires for easy maneuvering about the yard . . . for fast between-job towing at truck speeds.

B-G Unloader operates above or below the rails. Portable conveyor can be equipped with screens, power hoist and other accessory equipment. Capacity ranges to 150 t.p.h. Powered by gas or electricity.

56-13-PO

Barber-Greene BG

AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

B.F.Goodrich

All-Nylon Super Traction tires work 5,000 hours, can still be retreaded

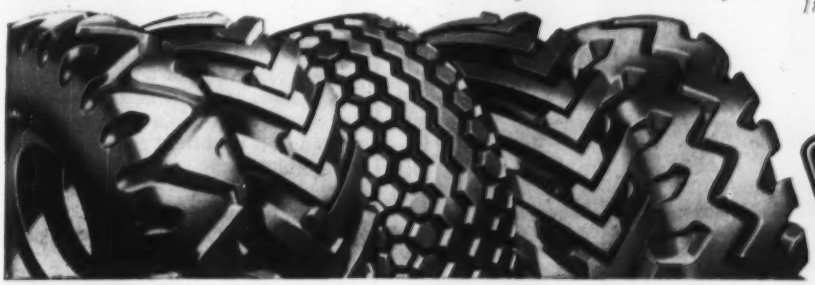
NORTHERN IMPROVEMENT CO. operates 95 vehicles in heavy highway construction work in North and South Dakota, Minnesota and Montana. The scraper above, when loaded, weighs 35 tons, works 60 to 72 hours a week on dirt and gravel roads or no roads at all.

Even under these rugged conditions, B.F.Goodrich *all-nylon* Super Traction tires give 5,000 hours' service before retreading, then give an additional 70% of new-tread service on one retread! One reason for such an exceptional record is the B.F.Goodrich *all-nylon* cord body. Nylon is stronger than ordinary cord materials, withstands double the impact and resists heat blowouts and flex breaks. The *all-nylon* Super Traction body outwears even the extra-thick tread, *can still be retreaded—often over and over.*

B.F.Goodrich builds the Super Traction tread with thick, widely spaced cleats that take a big bite into the soil, give you positive traction. Yet the extra-wide tread gives greater flotation in soft going. Work goes faster—you save money.

Your B.F.Goodrich dealer has a complete line of tires (left) for all types of off-the-road work. And he offers expert, on-the-job tire service. See him today or write: *B.F.Goodrich Tire Co., A Division of The B.F.Goodrich Co., Akron 18, Ohio.*

There's a B.F. Goodrich tire for every construction job



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BUILT TO 2,000 DIFFERENT SPECIFICATIONS

EQUIP CONTINENTAL WITH POWER PLANTS TAILORED TO THE NEEDS OF CONSTRUCTION MACHINERY OF PRACTICALLY ALL SIZES AND TYPES

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Continental Red Seals for specialized applications are available at closely-spaced power levels, in liquid-cooled and air-cooled models, for use on all standard fuels. And, strictly on the score of performance, economy and dependability, they are finding their way into more and more leading makes of road building and construction equipment for every operation from excavation on through final grading. Every Continental Red Seal is not only built for its job, but backed by parts and service facilities from coast to coast.

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In addition to its large engines, Continental builds an outstanding line of heavy-duty air-cooled four-cycle models for industrial applications requiring 2 to 4 h.p. Advanced engineering gives them easy starting, high dependability, and unusual lugging capacity at low speeds. For information, address Air-Cooled Industrial Engine Division, 12800 Kercheval Avenue, Detroit 15, Michigan.

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Reader Comment

Engineering Teachers

SIRS—I am one of the great mass of engineers who have reached the spot of retiring or not retiring. There are a lot of this type of engineers who need now, or in the near future, some part-time job to tune off their activities.

Who would be in a better position than these people with a lifetime of practice behind them to help in the lack of teachers to teach either at high school or college level? Most of these people live near institutions in either the big or small centers and should be an available source already trained.

If a circular could be sent out by the various engineering groups to get information on the availability and qualifications of these engineers, the response would number in the tens of thousands.

GEORGE F. KIMBER
Registered Professional Engineer
Giffels & Vallet, Inc.
Detroit, Mich.

Highest Rockfill?

SIR—If there is any material distinction between a rockfill structure with filter zones and an impervious core, and the more customary earth and rockfill dams, which utilize different percentages of rockfill in the various zones, then perhaps Brownlee Dam will have the distinction of being "The Highest U. S. Rockfill Dam" with an apparent altitude of 395 ft bottom of cutoff trench to crest of dam; or differential in elevation from bottom of filter zone at bottom of face, to the crest of dam (ENR Feb. 7, p46).

However, the writer would like to call your attention to several dams which we, together with our co-ventures (the J. A. Jones Construction Co. of Charlotte, N. C.), are currently building, which involve earth and rockfills, and which have greater height from base of cutoff wall to crest.

The Swift Hydroelectric Project on the Lewis River above Portland, Ore., for which we have general contract from the Pacific Power & Light Co.,

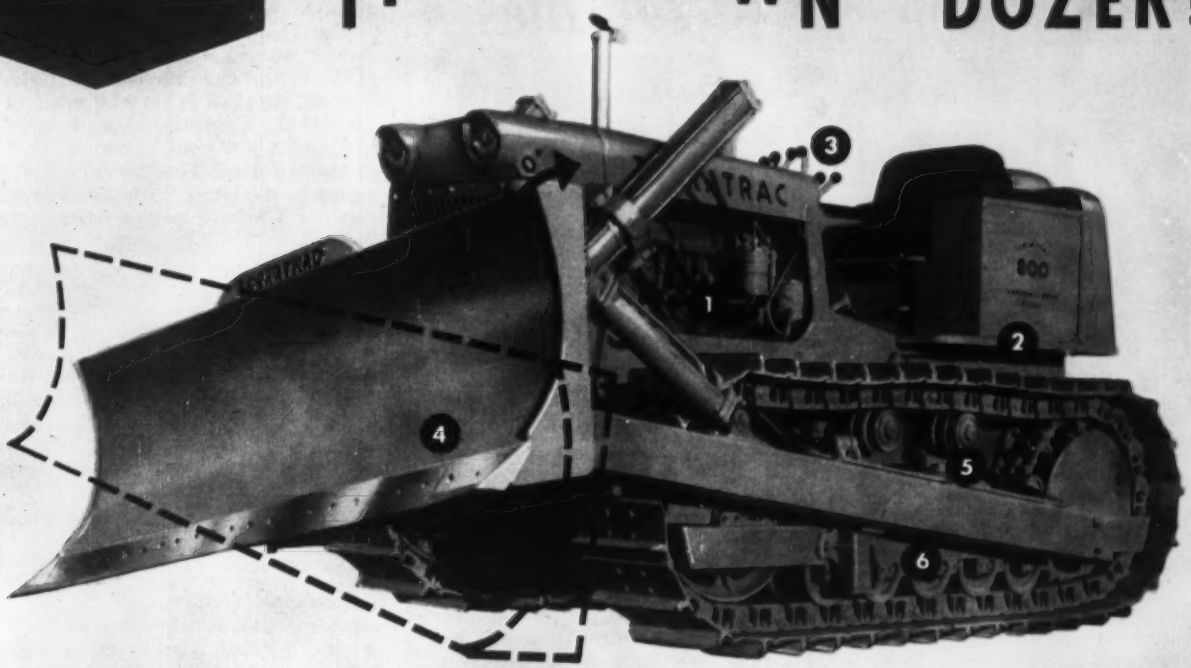
Engineering News-Record welcomes expression of opinion from its readers. Comment should be as brief as possible and pertinent to subjects of current construction importance.

Letters should be addressed: Editor, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

HERE IT IS!

...revolutionary new CASE-TERRATRAC®

"TILT-CROWN" DOZER!



Blade tilts and tips *hydraulically* from operator's seat

Here's just what tractor-operators have wanted for years... for ditching, crowning, grubbing, ripping hard ground, etc. It's the new Case-TerraTrac "Tilt-Crown" dozer—a *rugged 8' 8" blade* that tilts and tips to desired angle with the flick of a hydraulic valve-lever. Quick! Simple! Easy! Enables operator to *doze with full efficiency at all times*, without continually having to stop and "wrestle" a big heavy blade into tilt or tip position by hand.

And that's not all! This new torque-converter-equipped dozer also gives you *far more power, speed and ease of maneuverability* than any other crawler in its price range. New patent-applied-for counter-rotating transmission alone practically DOUBLES dozer output because it enables machine to make full 360° turns "in its own tracks"—*thus keep dozing in BOTH directions*, instead of backing up empty. See this sensational "Tilt-Crown" dozer now at your Case Industrial Dealer's, or:

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CT-D-15

SPECIAL FEATURES no other rig can claim

1. 80 to 100 HP with power-boosting torque converter.
2. Automatic, high-speed power-shifting transmission.
3. Exclusive 3-way power-steering . . . power-brakes.
4. Blade tilts 14" either side . . . tips 10° fore and aft . . . lifts 34" from ground, with finger-tip controls.
5. Torsion-bar equalizers permit full track oscillation . . . keep blade level for smooth cuts.
6. Automatic track lubrication system cuts greasing interval from once a day to a few times a year.

J. I. CASE COMPANY, Dept. C-141 Racine, Wis., U.S.A.

☐ Send literature and prices on new Case-TerraTrac "Tilt-Crown" Dozer

Name _____ Position _____

Company _____

Address _____

City _____ State _____

Industrial wheel and crawler tractors • dozers • loaders • backhoes • fork lifts

Townsend Tuff-Tite fasteners were selected to secure the Alcoa corrugated aluminum alloy roofing sheet on two of the world's largest aircraft hangers because their unique design provides great holding power combined with a watertight seal.

Previous roof systems, which depended upon nails to hold the roofing materials, failed when varying wind pressures and normal expansion and contraction caused the wood structures to flex. The nails worked loose, the protective coating became torn and blew off—the resultant leaks required constant expensive repairs. Almost a million No. 305 stainless steel Tuff-Tite screws now help provide a roofing system that will stay tight, withstand the racking of the timber frame and winds of hurricane force.

Townsend Tuff-Tite screws are made with the head and washer in one piece instead of two and are supplied with an assembled neoprene washer which is trapped and controlled by the undercut in the head when the fastener is tightened. The conical design of the neoprene washer helps lock the neoprene to the shank of the fasteners and serves to force it into the hole and seal it.

Tuff-Tite fasteners are available in stainless, carbon and alloy steel as well as many non-ferrous materials such as aluminum and copper. To learn how to achieve economical, watertight construction with Tuff-Tite fasteners, see the Townsend Company section of Sweet's Plant Engineering file, or write for bulletin TL-107. Townsend Co., P.O. Box 237L, New Brighton, Pa.

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. . . Reader Comment

is a dam of earth and rockfill construction in the various zones; the elevation of the cutoff wall at the base of the dam is approximately El. 500; the crest of the dam is at El. 1012; making an overall height of 512 ft.

The Derbendi Khan Dam in Iraq (which we are constructing with the J. A. Jones Construction Co.; also Tecon Corp., and Beton Monierbau of Dusseldorf, Germany) has designed height of 428 ft from bottom of cutoff to crest of dam. This project was designed by the Harza Engineering Company of Chicago, and is being constructed for the Government of Iraq Development Board.

The Palisades Dam, which Jones and Tompkins are constructing on the Snake River in Idaho, is larger in volume of rock and earthfill than any of the above, as far as rockfills go; but the elevation from bottom of cutoff trench is somewhat less than the Brownlee Dam, being approximately 300 ft from bottom of cutoff to crest of dam.

FRANCIS M. TOMPKINS
Senior Vice President
Chas. H. Tompkins Co.
Washington, D. C.

EDITOR'S NOTE: As Reader Tompkins implies in his opening paragraph, there is no question about the relative heights of these dams. Question is: Which of them are rockfills with impervious cores and which are earthfills with sizable rock zones?

Salt Water

SIR—I was both surprised and shocked by some of the data shown in the charts accompanying your recent article on the electric membrane process for demineralizing saline waters (ENR Feb. 14, p. 59). The condensation of Mr. Katz's talk may have removed the qualifications necessary to properly explain these charts, because, as they stand, I find them quite misleading.

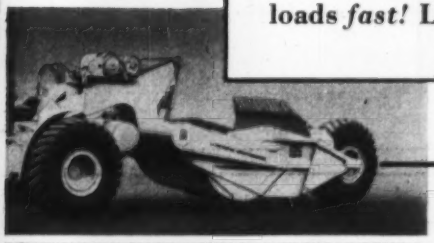
The data shown for Dallas and Oklahoma City appear to be derived from the June 1953 issue of the AWWA Journal containing 1950 water works operating data.

The upper chart shows initial maintenance and operating costs per thousand gallons for demineralization equipment but the comparable costs shown for Dallas, Oklahoma City and the U. S. municipal mean are undoubtedly total revenue divided by thousands of gallons produced and thus include distribution costs.

The lower chart shows that electric membrane plant costs are lower than Oklahoma City and Dallas book values. However, the Oklahoma City and Dal-

Why new 27-yd. B FULLPAK* scraper is your best bet for low-cost dirtmoving

The all-new LeTourneau-Westinghouse 28 mph B Tournapull®, with 27-yd. Fullpak scraper, gets *big* loads *fast!* Lower, wider, bigger . . . this giant dirtmover delivers more pay-yards at lower-net-cost than any scraper on the market. That means more profits for you . . .



Job-proven design

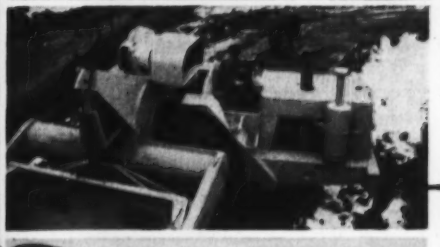
The new low, wide B Fullpak scraper incorporates popular high-production features that have been job-proven in world-wide service — for over a year — on the modern 18-yd. C Fullpak. Shallow bowl design means Fullpak needs less force for *lifting dirt* . . . can apply more to *cutting* and *pulling*. Bowl bottom has only 1° rise when loading. With dirt flow nearly horizontal, quick-loading 27-yd. Fullpak packs full-capacity, low-void payloads fast!

Better boiling

Tailgate has curved top, to roll material up and forward into a high heap. Side-sheets sweep higher in center, to reduce spillage and deflect material into corners of apron and tailgate. High, deeply curved apron adds bonus dirt-capacity . . . carries a big part of load forward in its "belly", for better weight distribution, lower center of gravity, and improved stability and traction.

Faster loading . . . unloading

High apron lift (7'1" above blade) speeds loading and unloading. Smooth, streamlined side-arms and side-sheets prevent chunks from being trapped. Positive forward-ejection tailgate has plenty of power to force out sticky clay, mud, rocks — wipes bowl clean in a single pass.



90° turns

Electric steer, through geared kingpin, permits short 90° turns. New B Fullpak makes continuous 180° turn in area only 39'10" wide. Also, positive kingpin steer enables operator to swing prime-mover from side-to-side in soft ground to let drive wheels find better footing and "walk" unit out of mud or loose sand.

Better visibility

Cockpit is raised to give Tournapull operator clear view of blade, load, pusher. Road ahead is always in full view. Permits safe, high-speed cycles.

Get all the facts

Get full details on the new B Fullpak — and on other job-tested LeTourneau-Westinghouse earthmovers. See why they'll help you move dirt faster, easier, at lowest-net-cost-per-yard. Write or phone for all the facts.

*Trademark BP-1403-G-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

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How molten metal helps give Galbestos its superiority

Robertson Color Galbestos has the greatest resistance to weather and corrosion of any protected steel roofing or siding obtainable anywhere. This position of broad superiority is made possible by a unique manufacturing process exclusive with H. H. Robertson Company.

First, the steel sheet is pickled . . . then given a coating of molten zinc. Asbestos felt is then pressed on so that as the molten metal hardens in cooling it grips the felt fibers in absolute bond. The asbestos is then impregnated with a special asphaltic compound and, finally, given a tough weatherproof coating. Galbestos can be furnished flat or in the 3 well-known corrugations: Standard, Mansard, and V-Beam. The resultant material is so durable, it may be sheared, bent, rolled, crimped and riveted in the field as easily as ordinary unprotected steel. It will withstand the greatest possible extremes in weather temperatures without deterioration, and will actually retard fire better than naked steel. For an industrial roofing or siding that requires no maintenance under the most severe corrosive conditions, specify Color Galbestos.

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Not Fragile. Color Galbestos' strong steel core sheet guarantees against breakage—during shipment or during erection.

Resists Climatic Extremes. Color Galbestos is not subject to damage either by tropic or frigid temperatures. Its coatings will not run under broiling sun or crack or spall in sub-zero weather.

Goes Up Fast. The exclusive Robertson Top-Speed method of attaching Color Galbestos to structural steel speeds up erection for quicker occupancy.

Resists Flame. Leading testing laboratories have made exhaustive tests on the fire resistance of Galbestos and have published the results. Copies of these reports are available for study.

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. . . Reader Comment

las book values probably include not only production plant and source of supply costs but the costs of pumping plant, distribution system, fire hydrants, meters and everything else used by the utility.

That demineralization costs are now comparable to costs being experienced by efficient municipal utilities, I am afraid, is far from actual fact.

W. Victor Weir
President
St. Louis Water Co.
University City, Mo.

Editor's Note—Reader Weir is quite correct on all counts. Katz included explanation of the municipal cost data in his paper; ENR should have included it in the article.

Source Omitted

Through an error, ENR's picture story on the reconstruction of a trestle on the Long Island Railroad (ENR March 7, p. 40) omitted the name of the source of the information on which the article was based.

The information, and three of the photographs used, was supplied by Abbott Oberndorfer, of Garden City, N. Y. A civil engineering graduate of the Polytechnic Institute of Brooklyn, Mr. Oberndorfer is now serving as an engineering advisor on industrial investments for the Equitable Life Assurance Society.

CALENDAR

1957 Nuclear Congress, coordinated by Engineers Joint Council, includes **2nd Nuclear Engineering & Science Conference, 5th Atomic Energy in Industry Conference, International Atomic Exposition** and **5th Hot Laboratories and Equipment Conference,** Convention Hall, Philadelphia, Mar. 11-15.

American Welding Society, Hotel Sheraton, Philadelphia, Pa., Apr. 8-12.

Building Research Institute, sixth annual meeting, Drake Hotel, Chicago, Ill., April 15-17.

Sanitary Engineering Conference on Solids Handling and Anaerobic Digestion, Manhattan College, New York City, Apr. 24-26.

International Commission on Irrigation and Drainage, 3rd Congress, Sheraton-Palace Hotel, San Francisco, Calif., April 29-May 4.

Building Officials Conference of America, Inc., 42nd Annual Convention, The Jung Hotel, New Orleans, La., May 6-9.

American Water Works Association annual conference, Atlantic City, N. J., May 12-17.

12th Purdue Industrial Waste Conference, Purdue Memorial Union Bldg., Lafayette, Ind., May 13-15.

World Conference on Prestressed Concrete, Fairmont Hotel, San Francisco, Calif., July 29-August 2.

Northgate Shopping Center at Memphis, Tenn., recently completed by Commercial and Industrial Construction Co. Adams 660 did all grader work on company's new 23-acre Southgate Shopping Center in less than 60 working days.

Rolling heavy clay hauled by 6 scrapers, Adams 660 grader spreads and levels fill at better than 6 mph.

How many...and what size graders would YOU use if you had:

- A 23-acre land-levelling job
- 400,000 cu. yds. of dirt to move
- 6 prime-mover scrapers
- 7000′ dirtmoving cycle
- 60 working days to complete

On this shopping center project, a Memphis, Tennessee company used just *one* grader... an Adams 660, working 11 hours, 6 days a week.

The Commercial and Industrial Construction Co., an affiliate of Union Realty Company, one of the largest industrial developers in the South, handled site development on the company's new Southgate Shopping Center at Memphis. Less than 60 working days were allowed for the grading.

Big grader works fast

To handle the grading, Oscar Moody, Superintendent for C.&I.C. Co., used an Adams 660. From previous experience with the Adams grader on the company's Northgate Shopping Center, he knew the big "660" could handle the grading unassisted.

Grading scraper-dirt on the fill, the Adams spread up to 8,000 yards per day. Heavy clay boiled off the blade at grader speeds to 6.7 mph. Surface-cutting and ditching was done in 2nd and 3rd gears at 3.2 to 4.7 mph. "660" hustled from one assignment to another at speeds to 26 mph.

7000′ cycle in 20 minutes

The Adams 660, working in hard-packed clay, kept 7000′ haul-and-return roads smooth for steady scraper operation... let rigs cut cycle-time, haul in 3rd and 4th gears. Watching, you could see the "660" dig-in without hesitation, "take-off" down the road, blading at 4.7 mph. After a quick turn-around, it graded the return route... completed the circuit in less than 20 minutes.

Bought machine after competitive demonstration

Philip and Jack Belz, owners of C.&I.C. Co., knew what they were getting when they bought the Adams. They bought after competitive demonstration on one of their jobs. After comparing several machines on the same work for speed, power, and ease of operation, one machine stood out... the Adams 660. The Belz's proved to their satisfaction — just as you can — that with 8 forward, 4 reverse, and 3 optional creeper speeds, Adams *actually produces up to 30% more work.*

Superintendent Moody sums it up this way: "You need a man to do a man's work! It's the same with graders. Adams is the most powerful. It will do more work than any grader we tried. It's completely dependable, and does all we ask of it!"

Makes best use of production time

Mr. Moody is right. The major reason Adams wins in competitive demonstrations is that the 150 hp "660" (as well as other heavy-duty Adams graders) provides more gear-ratios at which full engine-power can be used ... to cut deeper... to push more dirt faster than other graders. Adams graders gain up to 5000′ per hour in production travel. Creeper gears (optional) extend working range in very slow speeds, provide extra push-power, more accurate control, for precision work. Reverse speeds to 13.7 mph save time for forward, productive blade-work. Top speeds to 26 mph cut non-productive travel time.

See the difference

Why not do as Commercial and Industrial Construction Co. did? Compare the work of an Adams against that of any other grader. Call us and we'll be glad to demonstrate.

Adams—Trademark AG-1087-8-b-6

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

Muck 30 feet deep where a road must go!

...BUT GERKE AND CITIES SERVICE KEEP THE JOB ON SCHEDULE

North of Ladysmith, Wisconsin, Route 27 was practically floating in the swampland it cut through.

To Lawrence Gerke—sometimes known as "Gerke from Merrill"—went the difficult repair job. A job that involved working in a virtual lake, with muck and water up to 30 feet deep!

Under these conditions it would seem almost impossible not to fall behind the three-month schedule for completion . . . but "impossible" isn't in Gerke's vocabulary. And so, he pulled the job through, directly on schedule.

"But I couldn't have done it without the flawless performance of Cities Service lubricants," says the quiet man from Merrill. "Throughout the rugged months of work in muck and marsh, my equipment operated constantly without a single lubrication failure, thanks to Cities Service C-500 Motor Oil and Trojan Greases. When the chips are down, Cities Service comes through."

Mr. Gerke puts it in a nutshell. You can always count on Cities Service when the chips are down. But why wait until then? Why not start using Cities Service lubricants this week? A Cities Service Lubrication Engineer will gladly help you select the precise type for your equipment. Or, if you'd like more information, write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

"Gerke from Merrill" is the way Lawrence Gerke likes to be known. But he's better known for getting things done . . . and he uses Cities Service lubricants for the same purpose.

200,000 Yards of Borrow Dirt fill marsh where 100,000 yds. of muck were removed. Despite grueling work and tight schedule, Gerke finished on time . . . without a lubrication failure!

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

30 mph "C" hauls shovel rock

Babler Brothers, Eugene, Oregon, used "C's" with rear-dump bodies on this 160,000-yd. 7-mile relocation of U.S. 99 near Anlauf. All-steel body easily withstood shocks of loading big-chunk rock. Short 14'4" turn radius speeded positioning at both shovel and dump.

with 22-ton rear-dump

Here's just *one* profitable use for versatile, 208 hp electric-control C Tournapull prime-mover. Coupled to 22-ton rear-dump trailing unit, this 30 mph prime-mover becomes a big-production hauler. Rig can be operated at top speed, with complete safety, because it has 3763 sq. in. braking surface — *more on one wheel than most haulers have on all four.* Holding action of powerful 4-wheel, disc-type air brakes, plus *front-wheel drive*, let it back safely to edge of bank, dump load clear to save dozer clean-up. Simple electric hoist (no troublesome hydraulics) tips body to vertical position. Smooth, clean, streamlined bowl clears loads instantly. Big 8'9" x 10'10" top opening speeds loading from shovel, dragline, or loader . . . reduces spillage. When you have no shovel work, money-saving interchangeability with scraper *doubles* Tournapull's earning capacity.

...then converts for scraper dirt

with 18-yd. scraper

For less than 25% of the cost of original unit, rear-dump body interchanges with a low, wide 18-yd. Fullpak LeTourneau-Westinghouse electric-control scraper. All you need is the scraper body — wheels, tires, brakes, and controls can be switched. This substantially reduces the cost of unit interchangeability. Big 24.00 x 25 tires, all-around, assure ample flotation in mud. Constant-pull, power-transfer differential also reduces weather delays . . . gives positive traction on soft banks and slick grades. Thus, scraper and rear-dump keep your "C" prime-mover earning all year 'round. Other auxiliary hauled units —including a 16-yard Bottom-Dump, 20-ton Flat-Bed and 20-ton Crane — further save time and reduce equipment investment per job. This money-saving Tournapull package is available also in *larger* and *smaller* sizes. Write today for facts on performance, price, and delivery!

Brown and Lambrecht, Joliet, Illinois, used their 3 "C" prime-movers with fast-loading 18-yd. Fullpak scrapers, for widening 7 miles of U.S. 66 near Chicago. Units moved 180 pay yards of clay and topsoil hourly over 3-mile cycles. Scrapers can be interchanged with rear-dumps.

Tournapull—Trademark Reg. U.S. Pat. Off. Fullpak—Trademark RP-1332-G-b

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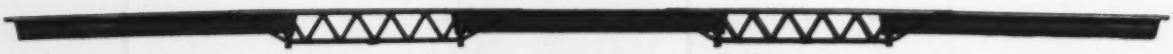

Simple adjustment sets correct camber as sections assemble to wide range of span lengths without need for intermediate vertical shoring

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Shockproof. There are no tubes or other delicate parts. Only a tiny, tough transistor circuit that is unaffected by impact, weather or daily construction abuse.

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Low-cost. Price is 15% to 25% below other flashers. You save on operating costs, too, due to longer battery life and lack of maintenance trouble.

Trouble-free. Uses radio panel bulb and standard batteries, available anywhere. Switches on or off from outside. Battery change takes only 20 seconds.

SEND FOR FREE CATALOG FOLDER, giving details and prices. Or, see your Dietz distributor.

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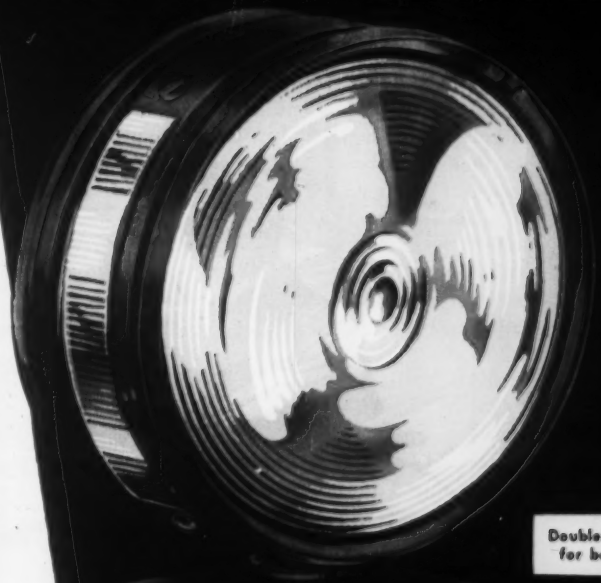
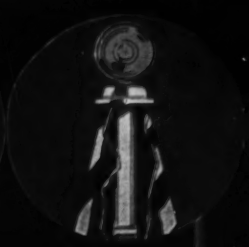


Double-face lens for barricades

360° lens, for barricades



Double-face lens, for traffic cones

360° lens, for traffic cones

Available in four models: Barricade or Traffic Cone styles with either double-face or 360° lens. write: R. E. DIETZ COMPANY, SYRACUSE, N. Y.

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Because an ample supply of water is vital to the government guided missile base at Cocoa, Florida, authorities inst lled 16 ,000 feet of 36″ and 64,000 feet of 24″ L K JOINT PRESTRESSED CONCRETE CYLINDER PIPE. Every joint of each 16′ section in this line fits dead center because the volumetrically measured rubber gasket exactly fills the annular recess in Lock Joint's self centering flexible Rubber and Steel Joint.

How many pounds of rubber were required to seal this line? The answer can be computed from the figures in the illustration above.

This is an interesting statistic, but more important is the fact that besides the volumetric measurement, careful tests for strength and elasticity are made on *each rubber gasket before it is used*. These are only a few of the many quality control tests which mark every phase of the manufacture of Lock Joint Concrete Pressure Pipe.

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Back issues of ENGINEERING NEWS-RECORD *are generally available for the previous six months. Price 35¢ each copy except Annual Cost Issue. Semi-annual indexes will be sent on request.* ENGINEERING NEWS-RECORD *is also indexed in Industrial Arts Index and Engineering Index.*

THE CONSTRUCTION WEEK

COMMERCIAL BUILDING BOOM—After a weak start, commercial building is beginning to boom. Awards have been consistently high for the past four weeks. This week, awards hit $83 million. In the past four weeks alone, awards have totaled $257 million, as against only $103 million for the first seven weeks of the year. Office buildings have been the biggest factor in the climb, with an assist from large shopping centers.

NEED A BRIDGE?—The Bureau of Public Roads plans to set up, in seven centrally located cities, a $7 million stockpile of portable bridges which can be used by states as both emergency and permanent installations. If Congress approves the plan, the components of 60 to 70 bridges of several types will be acquired and paid for by the bureau. States drawing from the stockpile will reimburse the government for the bridges used on the same matching basis as used for the road system getting the bridge. To keep the stockpile active, the BPR plans to get the states to draw bridges from it whenever possible, particularly for secondary roadbuilding.

RELOCATION IS UP TO UTILITIES—In a precedent setting move, Governor Simpson of Wyoming has vetoed a bill that would have required the State Highway Department to pay for relocation of utilities made necessary by highway improvements.

In 26 states such legislation has already been introduced this year. In five of these, the proposal has passed one house of the legislature and in Utah, it has passed both houses. Wyoming's action is the first final decision.

In explaining his veto, Governor Simpson said the bill would deplete highway funds that would have to be replaced by additional taxes on highway users. Thus, added the Governor, highway users would be subsidizing utilities that already have free use of public rights-of-way.

JUDGE SCOLDS ARCHITECTS BOARD—A Denver District Court ordered the Colorado Board of Architects to grant licenses "forthwith" to five applicants who had been turned down earlier. The five, all practicing architects in Denver, had applied for licenses under a 1955 law permitting the licensing of persons who practiced architecture for three years before passage of the statute. In reversing the board, Judge H. Joe Rawlinson ruled that ". . . The opinion of the Board as to whether the petitioner was a 'good' or 'bad' architect is immaterial and beyond the duties and powers conferred on this board." The hearings disclosed the fact that only two persons, of 55 who have applied, have been licensed under the 1955 law.

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As uses of pipe for piles increase, more and more contractors are calling on L. B. Foster Company for the best and fastest service available. These contractors know us as specialists in steel pipe for piling, in all diameters and wall thicknesses—spiralweld, electricweld, seamless, and lapweld.

On this river-span job we delivered 16-inch diameter Taylor-Forge Spiralweld foundation pipe (in 52 and 60-ft. lengths) as piling for bents of two bridges which span 135-ft. streams. While we are constantly supplying scores of small jobs every day, we'll also deliver all the material required for even the biggest jobs . . . to your job site, and . . . on schedule. No delays for you, no storage problems, more savings.

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Working from barges, Brennan Brothers of La Crosse, Wisconsin and Lansing, Iowa placed spiralweld foundation pipe in 8 feet of water, then had to drive through 40 ft. of Mississippi River sand, clay and mud bottom. Piling, supplied by L. B. Foster Co. was concrete capped, each measured 26 x 3 x 2 ft.

WASHINGTON OBSERVER

Budget-cutting talk is reaching new heights but it's too soon to tell whether it's really serious.

In general, construction spending is relatively hard to cut. Much of the spending is tied directly to projects being built, projects which obviously can't be stopped. They can be slowed down, of course.

First real chance for the budget-cutters is the money bill for the Department of Health, Education, and Welfare. The budget requests some $145 million for construction for the year beginning July 1—not counting schools. This compares with spending of $78.1 million for the same programs this year. The House committee—which gets the first whack—should vote it out in a couple weeks.

The integration problem may keep school grants from being voted. On the other hand, big highway spending is automatic now; tax funds are earmarked specifically for this new fast-growing program.

The big construction bills—public works and military construction—won't be voted out of the House committee until end of May. By that time you'll have some indication from action on smaller bills whether the Congressional talk about cutting Eisenhower's spending plans has any steam behind it. Most Washington people are skeptical that anything much will be done.

•

Taft-Hartley amendments for building trades will be submitted to Congress by the Eisenhower Administration. These are amendments agreed to by contractor and union representatives at meetings sponsored by Secretary of Labor Mitchell over the past few months. They cover:

A pre-hire proposal permitting NLRB to certify a craft union in any area where that union has traditionally represented the workers.

Language allowing employer associations to act as a single unit in a lockout situation.

Legalizing apprentice training funds as a fringe benefit which is subject to the collective bargaining process.

•

Government agencies hope to be able to compete better for skilled manpower as the result of a program drafted by a committee headed by General Electric President Ralph J. Cordiner.

Idea generally is to pay more for engineers and technicians, and give them faster promotions. As of now, though, it's still uncertain how far the Administration will go. The plan's adoption would add $600 million a year to the budget.

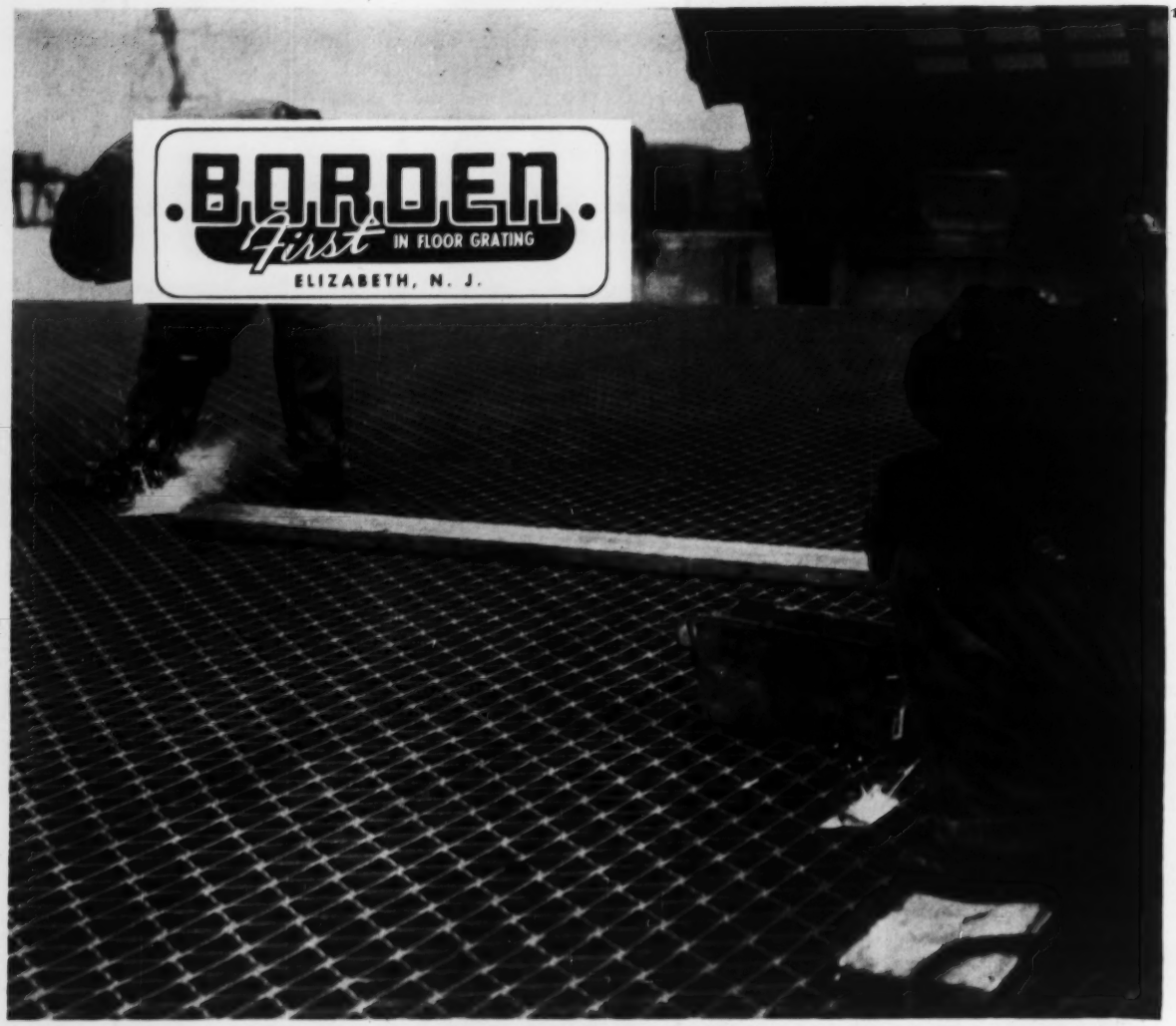
•

Business plans for spending on new plant and equipment are still going up according to government surveys released this week by the Commerce Department and the Securities and Exchange Commission.

Expenditures for 1957 will be 6.5% higher than last year—which hit a new all-time peak of $35.1 billion. The 6% increase, however, shows a significant drop in the rate of increase established in earlier years. Spending on new productive capacity in 1956 was 22% higher than 1955—one of the biggest percentage increases ever registered.

All major industries are expected to increase their spending rates during the first half of this year, with the exception of mining and commercial concerns. During the last half, the survey shows easing off, by durable goods manufacturers as well as commercial firms.

Public utilities forecast a 24% increase in their spending for new plant—the largest gain of any industry. Other increases: railroads, 19%; manufacturing, 10%; non-rail transportation, 7%. Declines: commercial, off 6%; mining, off 2% from last year.



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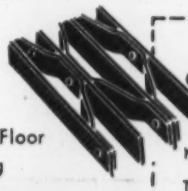

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Highway engineers reassured —

- **Design manpower will be adequate**
- **26 states soon will have computers**
- **Computer program pool is established**

Computers Will Pace Road Program

Due to "truly amazing" progress in utilizing new design tools, particularly the electronic computer, Prof. Harmer E. Davis, noted highway engineer, last week stated unequivocally that the great highway program will not lag because of engineering bottlenecks. Davis went this far out on the limb last week at a 3 day highway engineering productivity conference in Los Angeles attended by nearly 500 persons.

The conference marked the rapid progress in the adoption of electronic computers to the highway design field. In less than a year 26 state highway departments, plus numerous private consulting firms, have put such machines in use or on order. And in sharp contrast with earlier engineering productivity meetings, corridor talk was filled with the vernacular of computers.

• **Joint sponsorship**—The Los Angeles meeting was sponsored jointly by the Institute of Transportation and Traffic Engineering at the University of California (Prof. Harmer Davis, Director) in cooperation with the Bureau of Public Roads, California Division of Highways, Western Association of State Highway Officials and American Association of State Highway Officials.

More than half the session were devoted to exchanges of ideas and practices in the use of electronic computers, which were also demonstrated. But the conference also considered photogrammetry, electronic communications, plan simplification and standardization, economical use of construction equipment, and efficient contract administration. And an important result of the conference was agreement on a set of general principles for establishment of an electronic computer program library.

The limb that Davis got out on has been many months in growing. Speaker after speaker at various meetings of highway officials had expressed confidence in the capacity of all phases of the industry, except engineering, to meet the $100 billion challenge. In Los Angeles last week, American Road Builders Association Executive Vice President Louis W. Prentiss said that until 1960 engineering will be the controlling factor on the volume of construction accomplished under the expanded federal highway program. Influential Congressmen, said Prentiss, are already looking with question at slow progress being made by many states.

Summing up the conference, Davis reassured the group on being able to keep up with engineering needs. He noted that a year ago, at a similar meeting in Chicago, most people were just discussing what they intended to do in utilizing new methods and techniques such as electronic computers. Such progress has been made, according to Davis, that it can now be said with confidence that the great highway development program will not lag because plans, designs and estimates cannot be gotten out. These accomplishments should stand as concrete evidence to Congress that the highway engineering agencies have the necessary tools sharpened, and the highway program will go forward as planned, Davis concluded.

• **Computer conquests**—Current status of electronic computer use on specific problems was reviewed by representatives from several states (see next page).

California, the state that leads in obtaining production from computers, computes each month 200 to 400 miles of earthwork volumes and up to 50,000 traverse courses.

Ohio has succeeded in writing a program to produce design templets—the first such. A description by E. S. Preston of that state's work in achieving truly mechanized highway design by linking aerial surveying, photogrammetry and electronic computers was one of the conference highlights (see page 37).

In bridge design, the Bureau of Public Roads has developed a program for design of continuous span structures. Given the number of spans, span lengths, allowable stresses and loads, the computer can produce sizes of beams and size and length of cover plates required. The moment distribution method is used.

Georgia and California have similar programs for geometric computation of multispan skewed bridges on curved alignment, on either grade or vertical curve and with bents either parallel or not. The computer produces chord distance, centerline distances, rate of slope of beams, centerline elevations.

• **Program library**—The talk on programs—which included considerable emphasis on difficulty and expense of preparation—naturally led to a panel discussion for establishment of a central library by the Bureau of Public Roads at which tentative agreement on a plan was reached by those represented at the sessions. Prior to the Los Angeles meeting, Federal Highway Administrator B. D. Tallamy had written every state highway department asking their cooperation in such a plan.

In general, here's how the library probably will be operated:

States and others developing programs would submit them to either the equipment manufacturers or BPR, or both. After a thorough check by the manufacturer, the programs would be authenticated by BPR. New programs would then be available to anyone desiring to use them, including such nongovernmental agencies as consulting engineers. BPR would also have information on undeveloped programs that are felt to be needed and would set up a priority of program development.

(Continued on next page)

Thus, duplication of effort might be avoided.

Such a library would obviously speed the application of electronic computers to highway design. One complicating factor is that programs developed for one maker's equipment are not readily applicable for use on another manufacturer's machine. The revamping and recording of programs for use on other machines could take up to half as much time and effort as preparation of a completely new program.

The library would be directed by H. A. Radzikowski of the Bureau of Public Roads.

• Contractors' advice—One of the conference's most interesting and useful sessions in Los Angeles included four highway contractors. The group made several suggestions that would improve engineering productivity. But most of their comment was directed at better and more economical utilization of construction forces.

The contractors were in unanimous agreement on several points.

• They urged advance right-of-way acquisition as a method of speeding work. They wanted all right-of-way to be available before contract award.

• They suggested more thorough and efficient arrangements for utilities relocations. If possible utilities should be relocated in advance of award. If not, careful coordination with contractor operations should be accomplished.

• Care in prequalification of bidders was urged.

• And the contractors wanted specifications to designate desired end results and not detailed methods.

• But the most important point made was in connection with payment and its impact on contractor financing costs.

Wisconsin Highway Commission Chairman Harold L. Plummer, in introducing the panel, said contractors are going to have to meet tremendous financial requirements in the expanded highway program. This is accentuated, according to Plummer, because they must wait for payments for their work until certain sections are completed and then have a percentage of their pay withheld until final measurement of quantities are made and the job is accepted.

One contractor, Nello L. Teer, Jr., of Durham, N. C., called payment practices now generally in effect both antiquated and burdensome. He said retainers should in no case be more than 5%. He asked for quick final payments with payment guaranteed within 60 days. According to Teer, money is as much the contractor's tool as his tractors and pavers, and when his funds are unreasonably tied up the effect is the same as locking up his shovels and trucks for the same period. Teer asked that estimates provide for 100% payment for materials going into the work. And he wanted monthly estimates to be paid within 10 days.

The Los Angeles meeting was the latest in a series of engineering productivity conferences held during the last year in Chicago (ENR Mar. 15, 1956, p. 25), Albany and Atlanta (ENR July 19, 1956, p. 29). Sessions similar to those at these special meetings were also held at AASHO's annual convention in Atlantic City (ENR Dec. 6, 1946, p. 71).

Completed Computer Programs

These are in use by the agencies which developed them. BPR hopes to make them generally available through a program library.

In Surveying

- Determining unknown lengths, bearings, error of closure, traverse adjustments, coordinates and areas for closed traverses

In Road Design

- Centerline elevations given station and elevation of points and lengths of vertical curves
- Rate and direction of superelevation for stations along horizontal curves
- Elevations along design cross sections, including berms, side slopes, ditches and slope stake points
- Earthwork volumes between cross sections utilizing terrain and design templet data (good for design and final pay quantities).

In Structures (bridges)

- Stresses and deflections for—
  - Continuous girder bridges
  - Rigid frames
  - Trusses of all types up to 80 panels in length
  - Suspension bridges
- Geometric alignment of multispan skewed bridges on curve
- Design of composite beam
- Analysis of rectangular columns subject to biaxial loading

In Traffic

- Handling masses of statistical data in highway planning studies
- Development of trip desire data involving multiple correlation of population, distances, auto registrations, income, recreational facilities, etc.
- Delayed time studies
- Assignment of traffic to proposed new routes

In Other Calculations

- Extending, analyzing and tabulating contract bid data
- Area for clearing and grubbing
- Volumes of borrow pit excavation

Show Them Pictures

Air photos help public to understand road plans

Photogrammetry as an aid to public relations as well as engineering speed and economy was the theme of a meeting of the American Society of Photogrammetry last week.

At the session, held in Washington, D. C., William T. Pryor of the U.S. Bureau of Public Roads introduced a panel of speakers who, in general, encouraged the various state highway departments to make use of the science of photogrammetry in design and construction of highways.

John E. Meyer of the Michigan State Highway Department said that mosaic blueprints, ownership and land use maps can be used at public meetings in anticipation of road construction, to acquaint the general public with the necessity of a limited-access road.

"The public feels more at ease when aerial photographs line the meeting room walls," Meyer said. "They can see their property and how the proposed highway will affect it. They feel in some way as if they were participating in the program—consulted. Possible alignments are sketched upon the prints and at the first meeting exploratory information is discussed. At the second meeting, after the facts and figures are obtained, the final alignment is shown and right-of-way is secured."

Adequate topographic, ownership and land use maps, completely presenting a picture of all ground and other details as they actually exist are an absolute necessity for effective planning and designing of expressways, Meyer added. Alternate routes can be studied and the most feasible one selected with

a very minimum of effort and expense.

In view of the new federal highway program, J. E. Harwood of the Virginia Department of Highways told of some of the practical ways that airphoto interpretation can be utilized. Within the period of five months, 1,012 miles of Virginia roadway were located, completely reported and mapped with the inexpensive use of photos.

For topographic maps, intricate and expensive equipment is required, Harwood said. For land use maps and engineering-soil maps the only equipment required is photos, inexpensive stereoscopes and some form of transfer device. Transfer devices are sometimes unnecessary, and marked photos may be laid out in a mosaic and rephotographed as a unit. The photo mosaic may then be used as a map.

Speaking for the "recognized photogrammetric engineering firms" was Kendall B. Wood of K. B. Wood & Associates, Inc., Portland, Ore., who urged that some sort of pre-qualification be instituted for aerial survey firms. "Because of the new federal highway program, many new firms are being established with the sole intent of earning a few fast dollars," Wood commented. "There should be no competitive bidding, because the embryo firms will cut corners to meet competition. The state highway departments should avail themselves of the knowledge and competence of the old established firms with the qualified personnel."

Standards Revised

ASTM changes cover rivet steel, roofing, masonry grout and reinforcement

At the 1957 Committee Week of the American Society for Testing Materials, held in Philadelphia, some changes were made in specifications of concern to the construction industry.

• **Steel**—One proposal was that Committee A-1 on Steel develop a specification for a new steel-making process. Kaiser Steel and Jones & Laughlin Steel Corp. requested that the oxygen converter process be included in Specifications A 120 for black and hot-dipped galvanized welded and seamless pipe. The steel made by this process (known in Europe as the LD process) is used abroad for shipbuilding, pipe manufacture, pressure vessels, etc.

Committee A-1 drafted a new specification for alloy rivet steel suitable for use with high-strength low-alloy steel. The tensile strength range is 68,000 to 82,000 psi, with a minimum yield point of 50,000 psi, and a minimum elongation in 8 in. of 20%.

Specifications for large-size deformed billet steel concrete reinforcement bars (No. 14S and 18S) also were approved. Previously, No. 11 was the largest bar covered by ASTM specifications.

Now ready for subcommittee deliberation are specifications for hot-rolled plain rods in coils for concrete reinforcement and for uncoated 7 wire, stress-relieved strand for prestressed concrete. In addition, specifications for hot-rolled deformed rods in coils are being developed.

• **Wood**—Committee D-7 on Wood reported on an accelerated laboratory test method for the evaluation of natural decay resistance of wood. The committee also accepted revisions in basic principles for establishing structural grades of lumber, D 245.

Standard definitions of terms relating to fiberboards have been accepted, subject to letter ballot, and will be referred to the society for adoption at the annual meeting in Atlantic City in June.

Testing methods for trusses (E 73) will be extended by Committee E-6 on Methods of Testing Building Construction to cover wood trusses that now are being used in house construction.

• **Glass fabrics**—A specification for glass fabrics for use in water-proofing and in the construction of built-up roofs also is expected to be ready for presentation at the annual meeting.

A series of test methods for surfacing materials for built-up roofs is being studied. Specifications for brushable and trowelable cutback asphalt roofing materials also are under consideration.

• **Masonry grout**—Aggregates for masonry grout will be covered in new specifications accepted by Committee C-12 on Mortars for Unit Masonry. This specification will include both natural and manufactured sand used alone or in combination with coarse aggregate in grout for reinforced masonry.

A change in the minimum weight of vermiculite aggregate for use in interior plaster was approved by Committee C-7 on Lime. It revises the present limits in ASTM Specifications C 35 from 7½ lb to 6 lb minimum.

Hospital Plans $8 Million Complex

Baltimore's Mercy Hospital has now opened a fund drive to finance an $8 million building project on the institution's present block-square site. The first unit to be erected, an unusual 21 story tower with upper floors larger than the tower base, probably will be started next year.

Restricted in area at lower floor levels by existing buildings that must be kept in operation, the tower will retain its base plan dimensions up to the sixth floor and then it will get bigger. The seventh and higher stories will be longer and wider than the lower part of the building.

The sixth story, where the transition in size takes place, will be windowless and will house most of the building's mechanical equipment.

The first phase of the job also will include, besides the tower, as much of the lower new construction as can be fitted between existing buildings. In later phases, the older buildings will be razed.

Preliminary designs were made by Dr. Anthony J. J. Rourke, design consultant for the hospital, and two architectural firms, Taylor & Fisher of Baltimore, and Westermann & Catalano of New York.

Railroads Seek More Engineers

"Do-it-yourself" attitude urged for solving the problems of manpower and meeting competition

The nation's railroads must attract more young engineering graduates, double their present billion dollar-a-year expenditures for improvements, and cut costs to meet competition of government-subsidized transport media. This was told to the American Railway Engineering Association at its fifty-sixth annual meeting in St. Louis March 4-6.

All three points got emphasis in an address by Arthur K. Atkinson, president of the Wabash Railroad Co., who urged a "do-it-yourself" attitude toward the industry's problems, and warned that railroads could not rely on their supply industry to underwrite all the research needed to develop better methods and techniques.

It is up to you men who are the technical group of the railroad industry," he said, "to constantly question the established methods, the materials and the equipment we are now using in our business. Just because a method or machine has been tried and found true, is no reason that it cannot be improved and improved again."

The assertion that waterway and harbor development has helped create business for the railroads was made by Maj. Gen. E. C. Itschner, Chief of Engineers for the United States Army. He said railroads were the backbone of the national transportation system, but insisted that America also needed full use of and access to water resources.

Declaring that water had become the most important single industrial raw material, Itschner contended that water resource development was essential to expansion of production and vital, in the long run, to prosperity of the railroads. He put it this way:

"The railroads need industry; industry needs water development; therefore the railroads need water development. The relationship between the railway interests and the Corps of Engineers' water resource programs is as simple and fundamental as that."

More than 2,000 engineering and maintenance officials from the United States and Canada attended the convention. Ray McBrian of Denver, Colo., research director for the Denver and Rio Grande Western Railroad, was elected president to succeed William J. Hedley of St. Louis, chief engineer of the Wabash.

It seemed significant that Atkinson and other speakers emphasized the constructive action railroads had to take to survive, by improving techniques and services, rather than the legal and tax difficulties of which the industry has so long complained. Most of the meeting was devoted to research committee reports on technical problems.

Homebuilder Contracts for Suburban Sewerage

A sewage plan spelling the end of cesspools in a suburb of Phoenix has been approved by the City Council, which authorized the consulting firm of Yost & Gardner, Phoenix, to prepare plans and specifications for a $1.3 million project.

The project will be an independent sewage system serving the West Phoenix area. It is made possible through a contract with John F. Long, Phoenix homebuilder, who agreed to connect with the system 2,700 homes he plans to build between now and 1959. Long also guaranteed to connect with the city system every building he builds hereafter in a 10 sq mi area.

Within two years, the city expects to get between $110,000 and $125,000 a year from the Long-built homes in service charges, making the plant pay its own way with chances for a profit.

Estimate 37% Too Low, Salaries Are Blamed

When a Toronto paving cost estimate of $86,000 turned out to be $51,000 too low Deputy Works Commissioner Davison Sutherland blamed the city's low pay scale for engineers.

In admitting that the underestimate was due to the use of untrained men, and to not having enough engineers to make detailed surveys of city jobs, Sutherland explained his case briefly: Private industry is starting its engineers at an annual salary of $6,000, the city offers only $4,100 as the base pay. Because of this the Public Works Department is unable to keep junior engineers once they get experience.

PROPOSED BRIDGE will have main suspension span of 1,150 ft.

U. S.-Canada Bridge at Bid Stage

Bids will be taken later this month for construction of the first section of the substructure for a St. Lawrence River bridge between Ogdensburg, N. Y., and Prescott, Ont. The work involves construction of four piers and two cable anchorages for a 2,150 ft suspension bridge across the main channel of the river.

Five subsequent contracts will cover construction of the superstructure and approaches. All this work probably will be advertised for bidding before the end of the year. The plazas at the ends of the bridge will be constructed under separate contracts.

The suspension bridge has a main span of 1,150 ft and side spans of 500 ft. In addition, the structure has a total of twelve 250 ft deck-truss spans and seventeen 128 ft deck-girder spans. The deck is 31 ft wide and carries a 26 ft open-grid steel roadway, a 3½ ft precast concrete sidewalk and a 1½ ft curb.

Designed by Modjeski & Masters, consulting engineers, Harrisburg, Pa., in association with P. L. Pratley, of Montreal, Que., the bridge will be constructed for the New York State Department of Public Works under the immediate direction of Robert W. Sweet, district engineer at Watertown, N. Y. Operating the structure will be the Ogdensburg Bridge Authority, a New York state agency that also has corporation status under Canadian law.

New York State will advance $15 million for construction, the entire amount to be repaid through sale of revenue bonds within 1½ years after the bridge is opened to traffic.

Fluoridation: It's Still a Running Battle

- **FOR IT NOW are those who argue improved dental health in test cases. They point to acceptance of the water treatment practice in 1,400 U. S. communities.**

- **AGAINST IT are principally those with unresolved doubts about physiological effects. Other vocal minorities attack the practice on grounds other than medical.**

Fluoridation remains a burning issue. Even as more and more people take to drinking fluoridated water—over 30 million in 1956—opposition to the practice shows no sign of subsiding.

Supporters voice praise of artificially fluoridated water supplies as means for preventing tooth decay. Opponents are vocal in insisting that fluoridation is wrong.

Controlled fluoridation of water began with test projects in a few scattered towns during 1945. Results showed that the water additive produced marked reduction in dental caries, as much as two-thirds caries reduction among children, without causing any significant physical effects on the rest of the body.

By 1956, 1,400 communities, served by 705 water supplies, were reported using fluoridated water. Chicago, Baltimore, Philadelphia, Miami, Washington, D. C., St. Louis, Pittsburgh and San Francisco were among them.

But despite the ascribed benefits, numerous anti-fluoridation movements are afoot throughout the country.

Several communities who adopted fluoridation later repealed it—among them Greensboro, N. C., San Diego, Calif., Bangor, Me., Akron, Ohio, and Saginaw, Mich.

In the 300-odd times that fluoridation was put to a direct vote of the people it met defeat three times out of five. Most of the communities that adopted the practice did so through decision of elected officials.

New York, the nation's biggest city, does not fluoridate its drinking water. City officials are split on the issue. The Board of Health is all for it; the Department of Water Supply, Gas & Electricity is against it. Newark, N. J., has attempted a compromise by offering free fluoride tablets to city residents upon a doctor's or dentist's prescription. To date, takers have been few.

Medical men are not all in accord on the issue. Both advocates and opponents of fluoridation list doctors on their rosters.

The arguments continue to fly back and forth in one of the most hotly debated public health issues in years. Here are some of the official stands on fluoridation:

Public Health Service: The adjustment of the fluoride content of public water supplies is a safe, effective and economical procedure for the partial prevention of tooth decay.

American Dental Association: Whereas . . . evidence continues to demonstrate that fluoridation will have no untoward effect on general health and will significantly improve health through the reduction of dental decay, therefore be it resolved, that the American Dental Association reiterate its recommendation that all local communities be urged to adjust the fluoride content of their public water supplies to the level recommended by responsible state and local health authorities.

Department of Water Supply, Gas & Electricity, New York City: We are aware that the fluorides are extremely toxic substances and evidence exists to show that even at the recommended level of one part per million (ppm) fluoride in drinking water, people in fluoridated communities have been harmed. No satisfactory reason has been advanced to show why everyone in a community must be compelled to risk life-long extraordinary exposure to the toxic actions of fluorides, particularly when safer, more effective and more economical ways of administering fluorides for caries reduction in children's teeth have been pointed out and are available.

American Medical Association 1951): Fluoridation of public water supplies in a concentration not exceeding 1 ppm is non-toxic and its principle is endorsed. After considering the evidence available at this time, the Councils believe that the use of drinking

The Line-up

The latest, and perhaps hottest fight over fluoridation was waged last week in New York City where some 88 spokesmen for and against were heard in a marathon public hearing that began Wednesday morning and finished in the wee hours on Thursday. Listed below are some of the leaders from each line-up:

For . . .

Dr. Leona Baumgartner
Commissioner of New York City's Health Department

Dr. Benjamin Spock
Noted pediatrician—author and Chairman of the Committee to Protect our Children's Teeth

Dr. John W. Knutson
President of the American Public Health Association

Harry E. Jordan
Secretary of the American Water Works Association

Dr. W. W. Bauer
Director of Health Education, American Medical Association

Dr. Percy Phillips
Trustee of the American Dental Association

Basil O'Connor
President of the National Foundation for Infantile Paralysis

Against . . .

Arthur C. Ford
Commissioner of New York City's Department of Water Supply, Gas & Electricity

Dr. F. B. Exner
Seattle, Wash.

Dr. Simon A. Beisler
Chief Urologist, Roosevelt Hospital, New York City

Dr. George S. Aldbott
Allergist, Detroit, Mich.

Mg. Gen. Charles W. Christenberry, Ret.
Christian Science Committee on Publication of New York State

Dr. Herman F. Strongin
Sherman, Conn.

Dr. Johnathan Forman
Chairman of the ad hoc Medical-Dental Committee on Fluoridation

water containing up to 1 ppm of fluoride is safe. The AMA, at its Seattle meeting in November, 1956, instructed the Scientific Councils of the AMA "to reevaluate all available data on fluoridated water and render a documentary report on the subject."

First Church of Christ, Scientist to the Senate Subcommittee on Constitutional Rights: Christian Scientists feel that their religious freedom is violated when they as captive consumers are compelled to accept compulsory medication by having to drink fluoridated water provided by the public water system. We contend that fluoridation of public water systems does not meet the test of "clear and present danger" so as to be justified under the principle of a proper exercise of police power.

The Board of Health, New York City: The Board of Health's final recommendation is that New York City's water supply should be fluoridated for the prevention of about 60% of the dental decay which currently affects almost our entire population.

American Water Works Association: Recommendations for fluoridation are the prerogatives of the dental, medical and public health groups. When the proper authorities approve the treatment, it then becomes the function of the water works utility and industry to follow through willingly and intelligently where proper controls are assured.

And these are some of the arguments offered by both sides:

• **FOR**—Water fluoridation is an effective public health measure that offers approximately a 60% reduction in new dental decay. Its effects are most pronounced on children, but reports show that protection against tooth decay, when begun in childhood will carry over into the adult years.

The cost of adding fluoride to drinking water averages 10 cents per capita per year in most sections of the country, according to PHS. Development of a new dissolver announced recently, which makes it possible to use fluorspar, the least costly form of fluoride, may reduce the average cost to 3 cents per capita per year.

• **AGAINST**—Fluorides are poisons with a narrow margin of safety. Daily doses accumulate in the body and may leave harmful chronic effects over a period of years. If fluoride can mottle teeth, it is likely to have some effects on the rest of the system.

Most of the physiological studies reported were made upon children. Insufficient investigation has been made of the possible harmful effects that fluoridated water may have upon adults.

It's still a running battle.

Matching Funds Trouble States

Continuing preoccupation with the problem of providing funds to meet federal contributions under the new highway program was evident this week, as state legislatures began to grind out bills affecting the roads.

Almost all of the measures enacted and almost all of those still under debate had to do with finding increased revenues from two sources in particular—direct from the general consumer (through gasoline tax rises) and from commercial highway users.

Seven states—Connecticut, Florida, Indiana, Iowa, Michigan and New York—considered proposals to raise gasoline taxes by amounts up to two cents per gallon.

But nearly every one of the 44 legislatures in session had before it some sort of a bill to increase taxes on trucks.

Wyoming's legislature led off by approving a 7 cent a gallon diesel fuel tax (up 3 cents) and adjusting truck license fees. Other bills before the lawmakers proposed such things as tonmile taxes (Maine); weight-distance taxes (Montana); license fees (New Mexico), axle-levies (North Dakota) and such other matters as restrictions on weight, length and width of commercial vehicles.

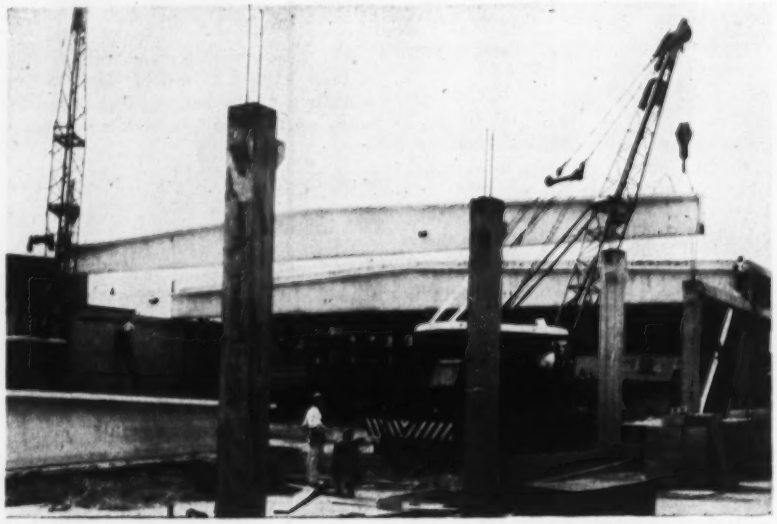
• **Slow going**—Although there was some activity, general progress seemed slow.

North Carolina legislators talked over a bill to affirm the right of the state to declare and enforce limited-access provisions; Maryland had a measure to ban billboards along the new roads.

And, of course, there was trouble in the offing too. It was typified by Arizona's Motel Association, which warned it would fight any attempt to bypass communities without approval by the community in question.

• **Progress notes**—Away from the legislative halls, however, there were ample signs of progress on the road front. They included:

Agreement between Kansas and Oklahoma, whereby a free road will be built to connect Kansas' turnpike with Oklahoma's Route 77 across the border; a scheduled meeting between Utah and Wyoming Highway Departments to determine the location of an access road to Flaming Gorge Dam—a part of the Colorado River development.



Prestressed Beams Span 100 Feet

Precast, prestressed concrete girders span 100 ft to support the roof of the Lafayette Market Building, now being completed in Baltimore. There are 12 girders in all, supporting a roof area 322x102 ft.

Weighing 48 tons each, the girders are 6 ft 3 in. high at the center and 4 ft high at the ends. Fifty ⅞ in. dia strands, each tensioned to 20,000 lb, were used to prestress each girder.

The roof deck is also precast concrete. Precast channel sections 8 ft wide span the 24 ft and 28 ft distances between girders.

Total cost of the project was $384,000. The building was designed by A. C. Radziszewski, Baltimore architect, and built by Kirby & McGuire, Inc., Baltimore contractors. Structural engineers were Ewell, Nelson & Bomhardt, of Baltimore. The girders were furnished by the Standard Prestressed Concrete Corp., of Whitemarsh, Md.

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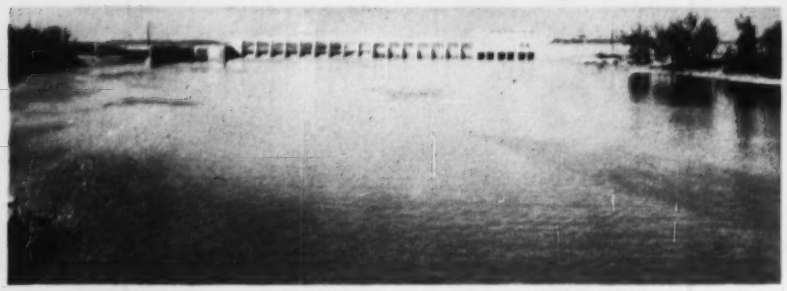
These three dams plus a fourth comprise the Apalachicola River Project in Georgia, Alabama and Florida.



JIM WOODRUFF Upstream view of navigation lock, vertical-gated spillway and 30,000-kw powerplant taken just before latter went on the line.

FORT GAINES Largest of dams is a rolled earthfill 13,570 ft long. Spillway is being

A Multipurpose River System Is Born

As first power from Jim Woodruff Dam went on the line recently, the little-known Apalachicola River system in Georgia, Alabama and Florida became a full brother to other great multipurpose river systems in the U. S. For Jim Woodruff is the first completed of four federal structures that will harness the Apalachicola and its main tributary, the Chattahoochee River, for navigation, flood control, water supply, waste disposal and, of course, power.

The second project, Buford Dam, is expected to be on the line this summer. Construction at Fort Gaines Dam, third and largest structure, is under way and is to be completed by 1962. Finally, there will be Columbia Dam, a small navigation structure that is to work with Fort Gaines.

Although these dams do not compare in size with what is normally envisaged as a multipurpose structures these days, nevertheless they will have an economic impact on a heretofore rural area not unlike TVA and the Columbia River system. A 9-ft navigation depth will be created on the Apalachicola and Chattahoochee up to Columbus, Ga., and a short distance on the Flint River. An additional 246,000 kw will be available to the region. Possibly most important of all, though unevaluated, will be provision of industrial water supply through storage at Buford and increased minimum flows throughout the river system.

Estimated annual value of tangible benefits from the four dams is $2.5 million from navigation, $7.4 million from power and $193,000 from flood control. These however, in no way measure the full impact of the Apalachicola River Project in terms of industrial expansion in the surrounding region. Cost of the project is expected to total $188 million.

• **Operation of system** — The Chattahoochee River rises at El 1350 in the extreme northcentral portion of Georgia in the foothills of the Appalachian Mountains. It flows southerly for 420 miles to the Georgia-Florida border where it joins with the Flint River to form the Apalachicola River. Total drainage area above Jim Woodruff is 17,150 sq mi and during an average year 16 million acre-ft passes this point. Peak flood flows of record are 55,000 cfs at Buford, 203,000 cfs at Fort Gaines and 293,000 cfs at Jim Woodruff.

Farthest upstream of the federal dams, Buford will be operated for flood control, power, water supply and low water regulation. Its reservoir has 637,000 acre-ft reserves for flood control and 1,050,000 acre-ft of power storage. The power plant houses two 40,000 kw and one 6,000 kw generators driven by Francis turbines. When both large units are off, the smallest generator will utilize water required for sufficient river flow. Normally the plant will provide peak load power.

During low water periods, flow of the Chattahoochee above Atlanta has been less than 350 cfs. With Buford in operation, average monthly prime flow during the critical dry period is estimated at 1,600 cfs.

Although the dam thus assures Atlanta an abundant supply of water, interestingly, clarification in the reservoir may hinder, rather than help, the city's water purification problem. At Atlanta, the large amount of so-called "mud balls" in the existing raw water is an aid to flocculation and subsequent settling (alum is the flocculent). During past high water periods, earth particle content has decreased, requiring the addition of clay at the plant for proper flocculation.

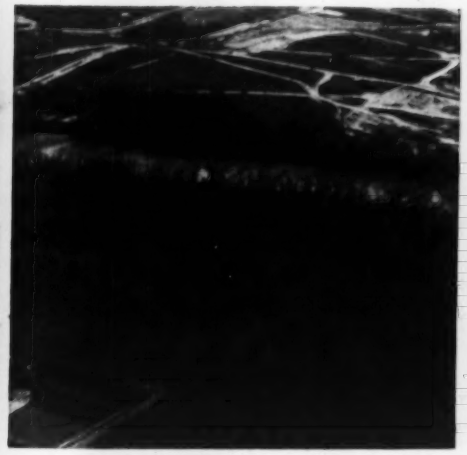
But while Atlanta water plant operators may be inconvenienced slightly, Atlanta and other cities in the area look to Buford for future water supply. Already negotiations are under way between various users and the Corps of Engineers to divert some water from allocated power storage for domestic use. Such diversion has been authorized.

Between Buford and Fort Gaines are several private dams operated as run-of-river structures for production of power.

Next downstream of the federal dams, Fort Gaines will be operated for navigation and power. It is planned to maintain the power pool at El 185 between December and April, when the heaviest rains occur, allowing fluctuations to El 184 to provide necessary pondage for power operations. From May through October power pool is to be kept at El 190. This arrangement will minimize reservoir land costs by reducing the area flooded after heavy rains.

Columbia Dam is required to provide 9-ft navigation depth between Fort Gaines and Jim Woodruff, size and location of the larger dams being limited by foundation conditions. Its main feature is an 82 x 450-ft lock., same size as lock at the adjacent dams.

Jim Woodruff will be operated generally as a run-of-river plant. Esti-



constructed inside cofferdam at left (on Georgia side).

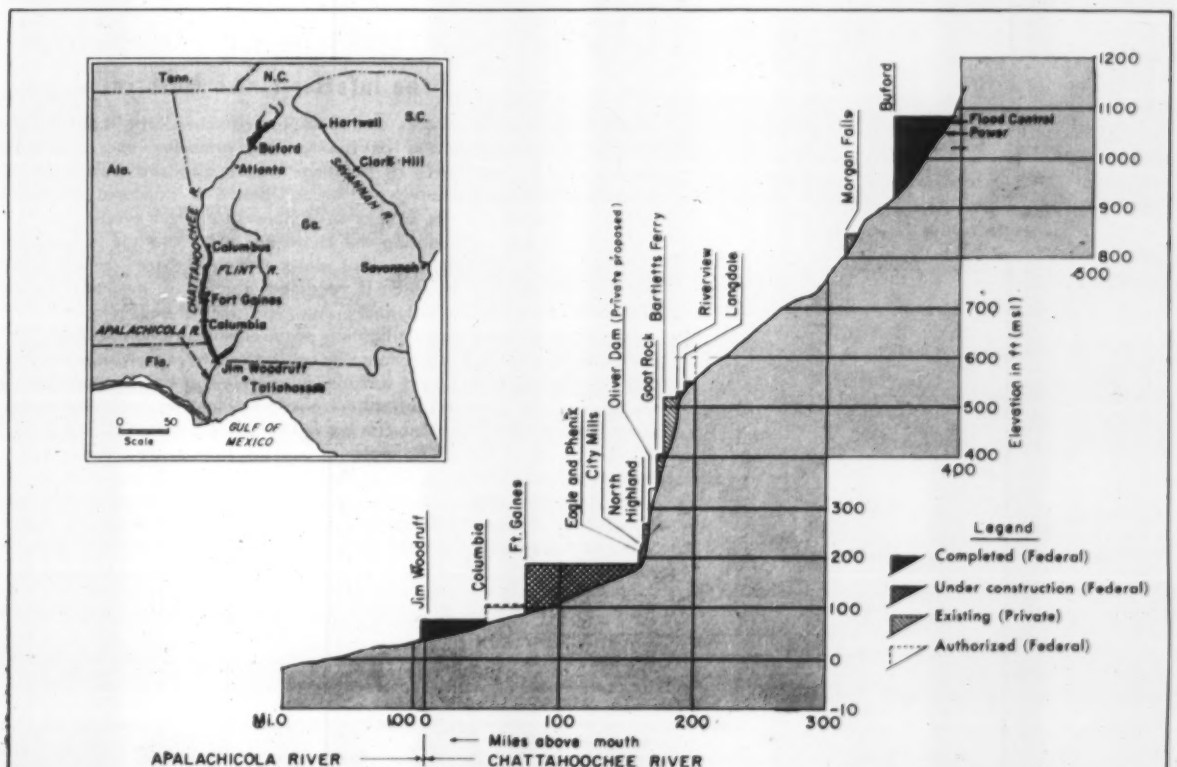
BUFORD Reservoir (at top) is now filled and powerhouse at left is almost complete with initial generation scheduled for this summer.

mated minimum average flow at Jim Woodruff, with Buford operating, is 7,350 cfs which is also the minimum release amount. Turbine capacity is 18,800 cfs. Normal pool is at El 77, however pondage in 1 ft of drawdown will be utilized when inflows are between minimum release amount and turbine capacity to make up the minimum release and provide turbine water at times when Fort Gaines is operating at low load factor. Flows greater than turbine capacity will occur about 40% of the time and resultant high tailwater will reduce turbine output.

All electrical power produced by the federal dams on the Apalachicola system will be delivered to the Southeastern Power Administration.

• **Foundations important**—Location of the three downriver dams was dictated in large part by foundation conditions. In this coastal plain are sedimentary rocks extremely variable in character and bearing quality. Jim Woodruff is founded on Tampa limestone of the Miocene age, the first usable bedrock above the mouth of the Apalachicola. Even here contractors met difficult conditions, described in ENR July 6, 1950, p. 35 and June 14, 1951, p. 33.

(*Continued on page* 31)



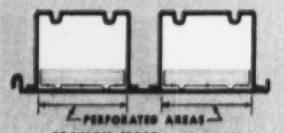
THE PLAN Jim Woodruff, Columbia and Fort Gaines are for navigation (up to Columbus) and power; Buford for flood control, power and water supply. Project will total 246,000 kw, provide 9-ft navigation depth, cost $188 million.

LONG SPAN M-DECKS

MAHON

ACOUSTI-STRUCTURAL

LONG SPAN M-DECK SECTIONS



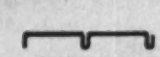
SECTION M2SR (Acoustical)

SECTION M2 (Acoustical)

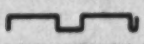
SECTION M3 (Acoustical)

SECTION M3R (Acoustical)

MAHON STEEL DECK



STANDARD DOUBLE RIB



WIDE-FLANGE DOUBLE RIB

Mahon Long Span M-DECKS Serve as the Structural Unit, the Roof Deck, and the Interior Finish Material as well!

Mahon Long Span M-Decks are ideal for combined roof-ceiling construction in such structures as auditoriums, armories, sports arenas, churches, and other types of buildings where exposed truss or rigid frame construction is employed. An M-Deck is a structural roof and ceiling combined . . . its structural sections span from wall-to-wall or from truss-to-truss, eliminating the cluttered effect of roof purlins and producing a neat, continuous, flat metal ceiling surface—all of which can be acoustically treated. If recessed lighting is desired, Mahon Troffer Sections can be included in this type of roof-ceiling construction in any ratio to meet specific lighting requirements. Mahon M-Deck Sections and Mahon Troffer Sections are roll-formed from galvanized, structural quality steel. Exposed surfaces in roof-ceiling construction can be readily painted to match or harmonize with any interior decor. All Mahon Long Span M-Deck Sections can be furnished with bottom metal perforated and sound absorbing material inserted to provide a highly effective acoustical ceiling . . . Noise Reduction Coefficients range up to .85 in Mahon Sections recommended for this use. Some of these Mahon Sections do not appear in the current Sweet's Files. Why not have a Mahon sales engineer call and bring you up to date on new Mahon products now available for Floor, Roof, and combined Roof-Ceiling Construction.

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MAHON

Apalachicola Project: Difficult foundations

Reach of the river around the Columbia is underlain predominantly by silty sands and clays and only at the site does the Lisbon formation of Eocene age contain suitable material. Fort Gaines is located at outcroppings of Clayton limestone of Paleocene age, the only material in this reach of the river that is adequate for the relatively high dam required by the development plan.

• **What dams look like**—Begun in 1947, Jim Woodruff is a concrete and earthfill structure 6,150 ft long overall. It consists of, in order, a 3,310 ft earthfill embankment, a powerhouse 760 ft of spillway fitted with sixteen 40 x 30½ ft high split-leaf vertical lift gates, an 82 x 450 ft lock and a 1,634 ft concrete overflow section.

Lock walls and concrete sections of the dam are gravity-type. Maximum lock lift, and also maximum gross head to drive three 10,000 kw generators, is 33 ft. Maximum dam height is 67 ft; total cost of dam, lock and powerhouse was $46 million. A more complete description, including several interesting money-saving methods employed by the concrete contractor, is contained in ENR June 14, 1951, p. 33.

Buford Dam, started in 1950, is a rolled earth structure 1,630 ft long, 192 ft high. An 860 ft long forebay and 1,300 ft tailrace have been cut out of rock on the west bank of the Chattahoochee.

Tunnels through the rock feed steel penstocks and a flood control sluice. Quantities are 3.7 million cu yd of fill, 560,000 cu yd of rock and just 70,000 cu yd of concrete for the powerhouse and intake structure. Total cost was $39 million.

Work at Buford saw some fast-moving earthfill operations, often exceeding 2,000 cu yd per hour, which are described in ENR May 5, 1955, p. 34.

• **Fort Gaines**—The biggest of the Apalachicola system projects got under way in October 1955 with award of an embankment contract. Fort Gaines is to be a rolled earthfill 13,570 ft long overall with concrete powerhouse, lock, spillway and non-overflow sections in the river totaling 1,420 ft in length. Fourteen 42 x 29 ft high tainter gates are to control the spillway and four 32,500 kw generators driven by Kaplan turbines will be installed in the powerhouse. These turbines are causing a stir over the "buy American" issue. The Corps rejected a bid by English Electric Co. that was 17% under the nearest U. S. manufacturer's price on the basis of "ambiguities" in the specifications and has now re-advertised (ENR Oct 4, 1956, p. 27).

Highlight of the project is the 82x 450 ft navigation lock, to be a single chamber of 88 ft maximum lift. However, the foundation is of considerable interest because of an artesian aquifer therein.

The high single-lift lock rivals those at McNary (92 ft) and Dalles (90½ ft), and those to be at Wilson (100 ft) and Ice Harbor (103 ft), and similarly requires intensive model studies. It will be located in the left (east) bank of the river and is tentatively planned to discharge into culverts running through the river wall into an excavated channel joining the natural channel about 600 ft downstream from the spillway axis.

Dewatering the foundation could become a problem, much as it was for Jim Woodruff. The Clayton formation at the site includes three layers: Uppermost is a chalky to earthy limestone of 45 ft maximum thickness that is generally firm and free of joints. The spillway apron and portions of the upper lock walls will be founded hereon.

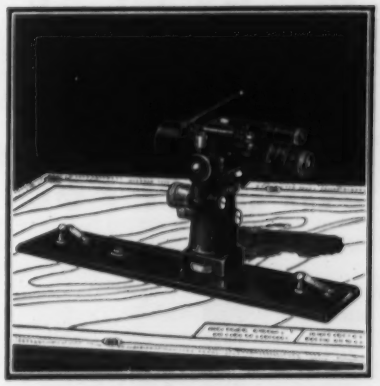
The middle layer is 40 ft of moderately hard gray coquina-type shell limestone that is quite pervious. It is to support all concrete structures except those mentioned above. All holes drilled in the river resulted in an artesion water flow from this layer. While top of the shell limestone under the dam structures is at El 77, the water had a static head near El 115 and flowed at 300 gpm through a 5½-in. hole discharging at El 101.

It is hoped that the excavation area can be dewatered by deep wells or by a well point system. Lowest layer of the formation is 36 ft of sandy, earthy and shell limestone plus a compact sand.

• **Re-regulating dam**—Columbia Dam is to be a concrete structure 637 ft long overall with 82 x 450 ft lock in the left bank and a gated spillway in the river channel. Maximum height is to be 33 ft, while maximum lock lift is 25 ft. Cost of this unit is estimated at $13 million.

The structure will rest on the Lisbon formation of Eocene age, consisting of 75 ft of silty sand, claystone and limestone above considerable thickness of sand which crops out in the river above the dam. The upper lock guide walls will rest on the silty sand, or sandstone, which is a uniform, massive, green sand partially indurated so that it has ample strength to support the relatively light loads called for. The underlying claystone and limestone will receive the remaining structures.

The claystone is a green, waxy, firm massive material present in several horizons, both in the silty sand and underlying limestone. The only continuous



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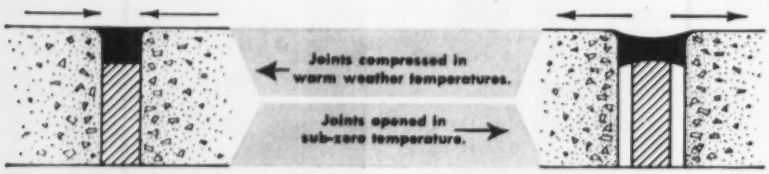

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Both materials form a resilient and adhesive seal which maintains bond with the concrete at sub-zero temperatures. Their stability is constant and they will not become soft and fluid during high summer temperatures. (See drawings above.)

Hot Poured, Para-Plastic JF and the cold applied Zero-Lastic JF are widely used, not only in new construction, but in maintenance of old concrete pavement as well. Both compounds can be pumped into the joint with readily available equipment. Hot Poured Para-Plastic JF meets Federal Spec. SS-S-167, and Cold Applied Zero-Lastic meets Federal Spec. SS-S-170.

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horizon occurs about 12 ft below the deepest excavation. It is 7 ft thick and confines artesian water.

The limestone material contains hard white and sandy limestone, green shell limestone and variably indurated calcareous sand. Underlying this layer at a minimum depth of 25 ft below base of the gate block is a medium to fine grained consolidated sand that contains artesian water.

Construction of Columbia Dam will be phased to insure its completion with Fort Gaines. Present plans call for work to start in 1959.

Planning, design and construction of the Apalachicola River Project are under the supervision of the Mobile District, Corps of Engineers. Col. H. E. Bishort is district engineer; G. B. Weston is chief of the engineering division; W. R. Coryell is resident engineer at Jim Woodruff and Fort Gaines and J. F. Stewart is resident at Buford.

Colored Route Signs Mark Florida Highways

Deciding that something should be done to cut down on the number of travelers who stray from their intended route, the State Road Department of Florida this year adapted a new system of colored route markers for federal highways.

For example, all highway signs designating U.S. 1 are red, U.S. 27 is in green, while U.S. 90 features blue. The signs are twice as easy to see because the traveler has both the color and numeral to guide him.

Made of aluminum with reflective sheeting, route markers have a colored shield on a white background. Numbers are in white superimposed over the shield.

For alternate routes, colors are reversed. Background and numerals are colored, and the shield is white. The signs are reflectorized for easy night and day reading.

An official color scheme has been adapted, and care has been taken so that no highway crosses another which uses the same color. Red, green, yellow, blue, orange black, and brown are the colors used.

Before the end of 1957, Florida hopes to have colored signs on approximately 4,000 miles of federal highways.

Florida is the first state to use colored route markers on a state-wide basis for all numbered federal highways it was said. Connecticut and the District of Columbia however, are currently using red on U.S. 1. Florida chose red for U.S. 1 to follow this pattern.

Road Board Chairman Wilbur E. Jones has written to other road departments in the southeast asking them to join with Florida in its new system.

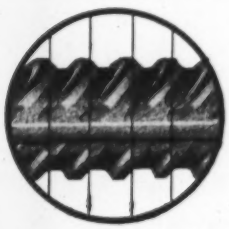
Sheffield Crescent Reinforcing Bars are shown in position as concrete is poured for precast deck units at the on-site precasting beds on the lakeshore.

SHEFFIELD

ARMCO

Crescent

Reinforcing Bar



Note the high, closely spaced deformations of Sheffield Crescent Reinforcing Bars. This results in a 6 to 1 ratio of shearing area to bearing area. See how the slope of the crescents gives not only continuity but also **overlapping** of deformations grip. The round core permits Sheffield bars to be bent readily without being thrown out of plane.

Sheffield Steel in "Backbone" of World's Longest Bridge

Build a precast concrete bridge over 24 miles of storm-lashed open water. Complete it four months ahead of a fast 23-months schedule. Result: an engineering and construction feat you can call hardly less than marvelous.

This marvel is Louisiana's Lake Pontchartrain Bridge. It's the world's longest highway bridge. It's a world-publicized masterpiece of beauty, safety and easy maintenance. In its "backbone" is the hidden strength of 16,500 tons of Sheffield Crescent Reinforcing Bars.

The extraordinary bonding efficiency of Sheffield Crescent Reinforcing Bars is a chief factor in lowering maintenance costs because it prevents development of damaging cracks. For a stronger "backbone" in your reinforced concrete structures, specify Sheffield bars.

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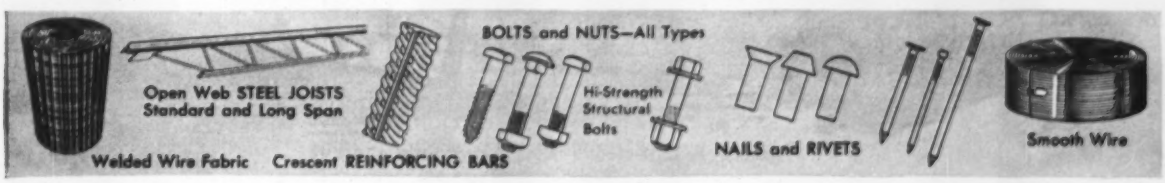

10 QUESTIONS every before

Can you answer all 10?

1. What types of accidents are most likely to occur on a highway project?
2. How do you plan for safety?
3. Is a safety policy necessary?
4. What is a most important objective of an accident investigation?
5. What signs are required to protect the public?
6. What about detours and barricades, adequate and safe provisions for moving traffic adjacent to work areas?
7. What procedures are important to safely control clearing rock and earth excavation problems?
8. What safety equipment should be used by highway workers?
9. Is provision for first aid desirable?
10. How should job vehicles be kept under control? What about safety of equipment at the site when not in use?

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Eliminating accidents is not only one of the surest ways to keep costs in line but also helps to keep bids low, and assures completion of contracts on time to help maintain a firm's reputation for reliability.

Knowing the answers to the 10 questions listed here and putting them into practice can assure any contractor of the benefits to be derived from an adequate safety program.

For many years, American Mutual has helped highway contractors with safety problems. This includes an unsurpassed safety engineering service which can cut accidents to a minimum and reduce insurance costs, a claim service that's prompt and fair and an outstanding rehabilitation service for workers who may be unavoidably injured.

Mr. Friendly's book gives the answers!

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CLEVELANDS dig 200 miles for water system in Gwinnett County, Ga.

Buchanan Pipe Line Company, Inc. of Birmingham, Ala. used 5 Cleveland trenchers to dig 200 miles of trench for a county-wide water system in Gwinnett County, Ga.—a multi-million dollar project requiring approximately 275 miles of pipe work. Digging 11" to 30" wide and 2½' to 4' deep in rolling terrain and in soil ranging from rock to sand clay, each of the 5 Clevelands averaged 3,000 feet of trench per day, working in wet weather.

Paul A. Buchanan, executive vice president of Buchanan Pipe Line Company, Inc., says this about Clevelands:

"We have bought 12 Clevelands since 1945, are now operating 6. Their performance has been entirely satisfactory, as evidenced by our repeat orders. In wheel-type machines we have standardized on Clevelands. We particularly like their simplicity of operation and maintenance and their good performance under adverse conditions."

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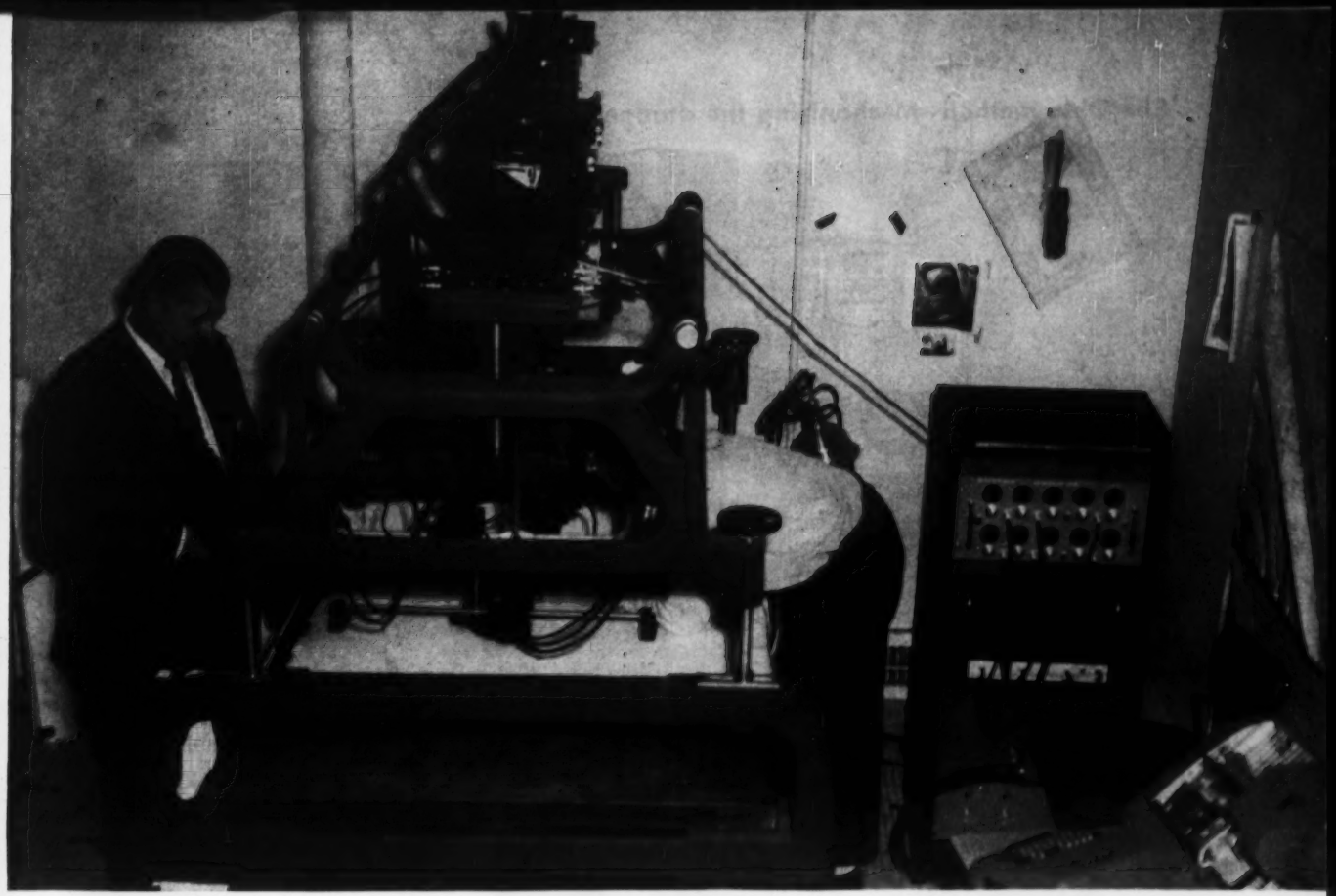


Highwayman E. S. Preston watches his automatic linkage of photogrammetry and electronic computer go into operation as . . .

Ohio Mechanizes Highway Design

The equivalent of breaking the sound barrier in the field of highway engineering has been achieved by Ohio's Department of Highways. This month Ohio embarked on a system of mechanized highway design that is an inspired conception of new tools to do an old civil engineering job, and in a manner that departs remarkably from conventional procedure.

The system takes the youthful sciences of aerial surveying, photogrammetry and electronic computing—each individually an outstanding tool—and integrates them with new mechanical and electronic links to achieve substantially greater benefits than the sum of the parts.

Accurate determination of these benefits at this time is not possible. But E. S. Preston, veteran highway engineer and the man who deserves much of the credit for Ohio's accomplishment (see page 81), offers these estimates confidently: In comparison with ground surveying and desk calculating methods, the Ohio method can eliminate up to 60% of the manhours involved from initial location studies through production of plans. It eliminates almost all the sub-professional drudgery, leaving the highway engineer free to concentrate on the most important aspects. Dollarwise, design savings could range up to 40%.

However, Preston and others feel certain that while manpower savings meet the pressing need of the moment, reductions in construction costs through more economical alignment and grade will be more significant in the long run. Present guesses are 5 to 10% lower construction costs in rough country, 3 to 5% lower costs in rolling and flat terrain. Type of terrain also affects design savings.

• **The Ohio method**—Just what has Ohio wrought?

It can be compared conveniently to the design steps followed for many highways today: Study of available maps; ground surveying for location; choice of a line; desk calculator computation of horizontal curves; ground surveying for topography and cross section data; establishment of grade; desk calculator computation of station elevations, superelevations, rod readings and elevations along design cross sections; manual plotting of cross sections; planimeter or strip methods of figuring earthwork volumes; and desk calculator computation of quantities.

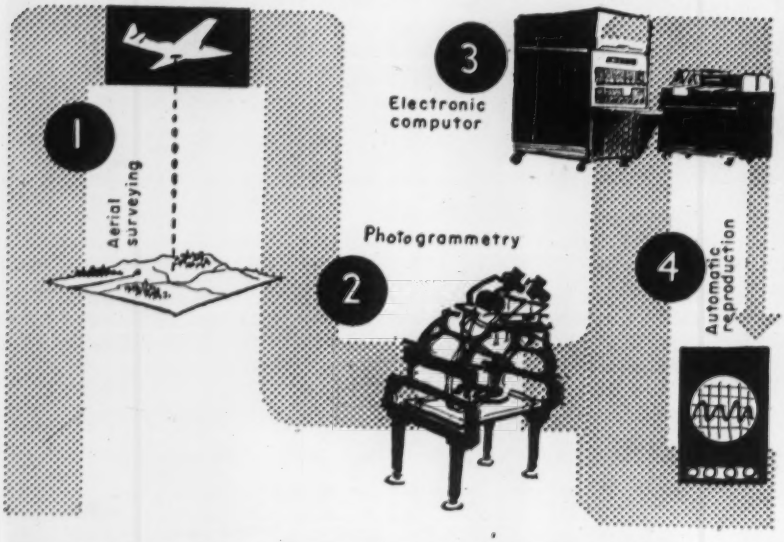
In sharp contrast, the Ohio method mechanizes just about everything except engineering judgment. The procedure is as follows:

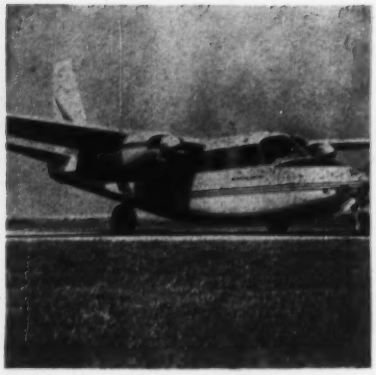
• Study available maps (USGS 10, 20 ft contour) and pick one, and sometimes two, 1½ mi wide strips.

• Fly at high level, usually 6,600 ft. Ground control is established using a theodolite and subtense bars (horizontal equivalent of stadia) in short base triangulation.

• From aerial photos at 800 ft = 1 in. a stereoscopic viewer, the Kelsh plotter,

. . . The Ohio method—Mechanizing the drudgery





1. AERIAL SURVEYING Ohio flies band twice, at altitudes of 6,600 and 1,650 ft, laying centerline on ground before second flight in order to get better control in photos.

produces a 5 ft contour strip at 200 ft = 1 in. This is accurate enough for the designer to establish line and tentative grade. A simplified version of the automatic hookup between plotter and computer described below, involving cross sections every ½ mile or less, enables reasonably accurate checks to be made of alternate lines and grades and for earthwork balance—all literally within minutes. Centerline, spirals and other horizontal curves are laid out. Shortly, the electronic computer will produce at this time a table of deflection angles and chords to aid a field crew in running the centerline on the ground.

• Actual centerline is then run on the ground. Ohio reasons that this has to be done anyhow and why not at this time so better horizontal and vertical control can be obtained in subsequent low-level aerial surveying. Property lines and a circuit of bench levels are also put in and elevations along the centerline are read with very little extra effort. Muslin strips or lime spots mark the centerline every 300 to 500 ft so that at least two such markings show up in every aerial photograph. Thus, the centerline is built into the second aerial survey with both horizontal and vertical control, and accuracy of subsequent photogrammetry is jumped way up.

• Line is flown again at low level, normally 1,650 ft.

• Transparent positive prints (diapositives) are produced from photos at 200 ft = 1 in. Kelsh plotters are used first to produce planimetric maps at 50 ft = 1 in. which will be reproduced photographically for direct use in contract plans. The plotters also make 2 ft contour maps which are enlarged to 20 ft = 1 in. for key areas where bridges, interchanges and the like are located. Ohio's method thus far is significantly, but not radically, different from normal aerial photogrammetric methods.

• With a horizontal measuring device added onto a Kelsh plotter, horizontal and vertical coordinates of points along cross sections are automatically punched into standard electronic computer punch cards. The cards so produced are known as terrain cards.

• A stack of cards with similar horizontal and vertical coordinates for points along design cross sections is obtained through a series of rapid-fire passes through the computer. Berms, ditches, side slopes and superelevation are all accounted for automatically.

• Earthwork volumes are obtained simply by running the terrain and design cards through the computer together. Volumes between sections, seeding areas, slope stake coordinates (for field crew use) and even a mass diagram are automatically printed out on tabular sheets.

• Design and terrain cards are combined once again through several electronic mechanisms which automatically project individual cross sections on an electron tube that looks like a small television screen. Each cross section is photographed automatically. These are studied by the designer who refines each section as necessary and can spot obvious errors. Sections designated by the designer are reproduced for inclusion in the contract drawings. Even at this point in the design process, it is a very simple matter to change line and grade: all the steps beyond the low level flight take but a few hours for a good number of miles of road.

• Summaries of quantities that ar normally included on contract drawings are run in a computer and reproduced.

• Lastly, the same earthwork steps in the design procedure are utilized to determine pay quantities after the road is built.

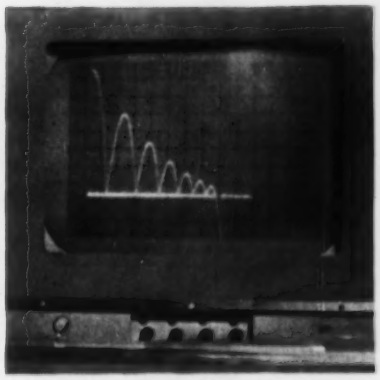
• **A closer look**—Swinging back to the modified Kelsh plotter for a closer look, we see a typical unit with four new attachments: (a) a horizontal measuring device connected to the moving plotter head seen in an accompanying photograph; (b) an electrical connection from this device to an electronic conversion unit; (c) a similar electrical connection from the standard micrometer screw that measures vertical movement; and (d) the conversion unit. Signals are sent to an electronic counter (upper right in photo) which is linked to a standard business machine punch, which makes the holes in the punch cards. The punch can be actuated by an operator via a keyboard or by the plotter operator depressing foot treadle.

Horizontal movement of the plotter is sensed by a drum which rotates as the plotter moves. The drum makes an electrical contact corresponding to every 0.1 ft of terrain and this signal is amplified and transmitted to the counter. Similarly, vertical movement of the screw is sensed every 0.1 ft. Measurements in either direction, with a capable plotter operator, are reliable to 0.3 ft or better.

In operation, the plotter operator lines up the horizontal bar perpendicular to the alignment at the desired cross section and obtains his reference point on the centerline, which is built into the diapositives and for which field measurements have been taken. He records station number on a punch card via the keyboard and flicks a letter on the counter to indicate whether sub-

2. PHOTOGRAMMETRY Modified Kelsh plotter reads both elevations and horizontal coordinates along cross sections from prints; readings are fed automatically to computer.

3. ELECTRONIC COMPUTER Profile, superelevation, design templet and earthwork quantities are all produced by computer in fraction of normal time required.



4. AUTOMATIC REPRODUCTION Cross sections are delineated on oscilloscope and photographed. Designer studies for refinements, prints are reproduced into plans.

sequent readings are to right or left of centerline. Then all he does is concentrate on the stereoscopic aspects of the plotter. When he is focused on a point, he depresses the foot treadle and horizontal and vertical coordinates are automatically recorded on cards by the punch machine.

This ingeninous linkage was conceived by Mr. Preston and built under contract by the Battelle Memorial Institute, Columbus. Additional units for Ohio and presumably others are to be manufactured commercially soon.

• **Design templet**—To get the design templets in a similar punch card form, Ohio starts from a profile made from the high level flying. For each vertical intersection (PI), the appropriate station number, elevation and length of curve selected by the designer are operator-recorded into a punch card. From these relatively few cards for the length of road under design, an electronic computer automatically prints out on tabular sheets station elevations along the centerline for curved and straight sections and the percent grade of straight sections. The computer utilized by Ohio requires punch cards for input and produces its answers on other punch cards, known as output cards. Information on the output cards can be printed out if desired. The input cards can be retained or disposed of.

For horizontal curves, the chosen degree of curvature, length of transition spirals, length of curve and rate of superelevation are operator-punched onto input cards, a single card for each curve. A table giving rate and direction of superelevation for each station along the curve is automaticaly computed and printed out. This table is also reproduced for inclusion in contract drawings.

Then referring to the tabular sheets for profile and horizontal curves, an operator picks off for each cross section station the centerline elevations and rate and direction of superelevation and punches this information into cards, one for each station (if a cross section has no superelevation data the computer knows it is a standard crown section).

This new stack of cards is merged with the terrain cards (on another wonder machine, a collator) to form an input deck for the electronic computer. The computer now produces a set of output cards containing horzontal and vertical coordinates for points along the design templet, including berms, ditches, side slopes and catch, or slope stake, points. The computer has been given sufficient instruction so that it knows how to adjust for varying slopes, which in Ohio change between 2:1 and 4:1 depending on location of the catch points in relation to berm or ditch.

• **Earthwork volumes** — Another pass through the computer, using merged decks of terrain cards previously available and the design cards produced on the last run, produces earthwork volumes between cross sections, areas requiring seeding, slope stake information for field crews and even a mass diagram. All are printed out automatically on tabular sheets.

For a 5 mi length of road through rough country, with cross sections every 50 ft, the above process from terrain cards to earthwork volumes can be accomplished in six hours. A good plotter operator should be able to cover about 1 mi per day, including cross sections and the 50 ft = 1 in. planimetric maps.

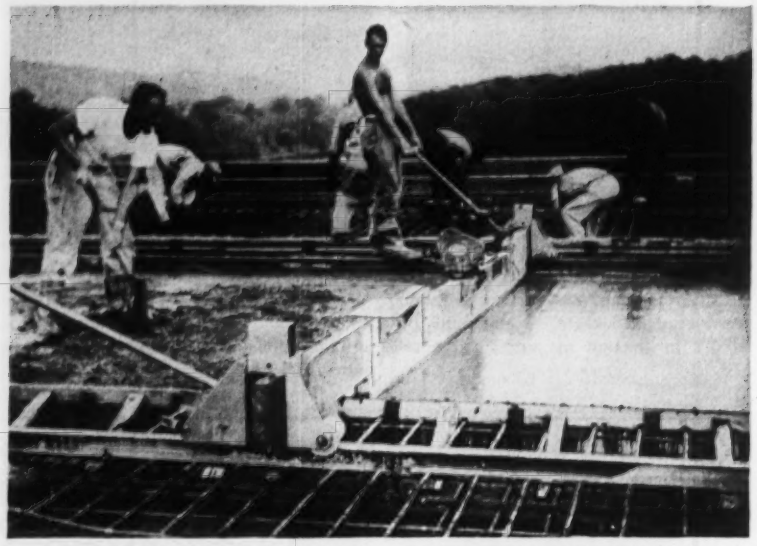
Ohio had its computer with accessory equipment (punch, printer, sorter and a verifier for checking the punch) installed this month. Only one of the plotter horizontal measuring device connections is on hand—Ohio will have three plotters so equipped.

• **Is it right?**—Early in the development of the Ohio method, Preston recognized that accuracy depended on the plotter operator, who is not infallible, and that a simple method of modifying cross sections by the designer was imperative. So he conceived an arrangement whereby cross sections could be delineated automatically. As now developed by the Battelle Memorial Institute, the same punch cards that go into the computer for the earthwork calculation are inserted into the punch machine which then becomes an "interpretor." It transmits point information to an oscilloscope which connects the points on its screen in a manner similar to electricity arcing across two conductors having high voltages impressed. A bar to indicate scale is also shown. Auxiliary devices clamped to the oscilloscope screen show station number, elevation of centerline for terrain and for design section.

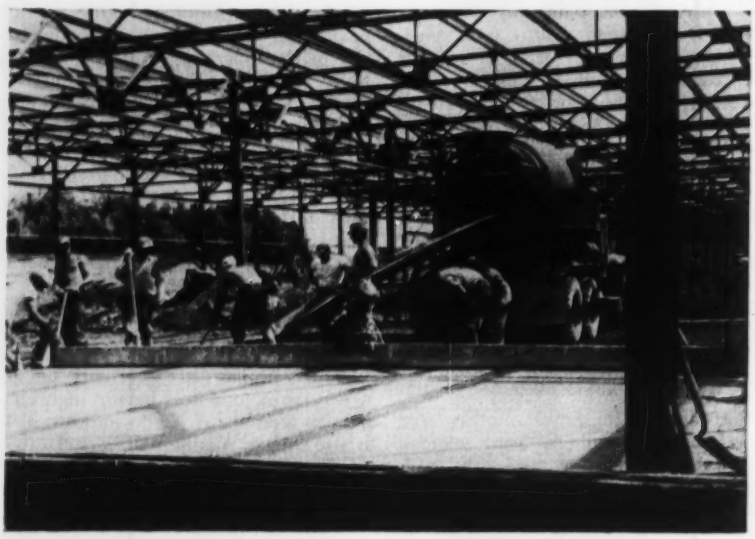
An open shutter 35 mm camera photographs the screen which does not hold its image very long, indeed not long enough for the entire cross section to be seen at one time. Prints can be studied by the designer who can indicate the modifications he desires and, of course, can catch obvious errors. Those cross sections desired for inclusion in contract plans can be reproduced automatically by standard equipment which Ohio has on hand.

(*Continued on page 40*)

STOW SCREEDS CUT BRIDGE DECK PRODUCTION TIME IN HALF



Here's the story. The Brunalli Construction Co. had the contract to finish the bridge decks on the Massachusetts Turnpike. They used a Stow 14 ft. vibrating screed, and a 20 ft. screed on the job, employing a special underslung beam so that the "I" beam rails could be located above the surface of the concrete. Because Stow Screeds can strike off *stiff* concrete smooth and true to grade, experience has proved that they cut production time almost in half . . . even on bridge decks!



Screeding Floor of new IBM Plant.
Here a 25'3" Stow Vibrating Screed strikes off a floor in the new $12,000,000 IBM plant in Owego, N. Y. The entire plant was laid out in lanes of equal width so that the same screed beam could be used throughout. This power unit on this screed can be bought as a package to be mounted on your own beam.

For more information on this equipment, contact your Stow Distributor (listed under "Concrete Vibrators" in the yellow pages of the telephone directory of most cities) or write for Stow Catalog 560—and complete information on Stow Vibrating Screeds, Vibrators, Roto-Trowels, and Concrete Grinders.

STOW

STOW MANUFACTURING CO., 19 Shear Street, Binghamton, N. Y.

. . . The Ohio method

Although the oscilloscope arrangement has been perfected, it is possible that another arrangement will be substituted. This is a continuous line plotter which can be actuated by the same input arrangement used for the oscilloscope. By means of electro-mechanical circuitry, a pen can draw out a reasonably good looking cross section at any scale desired, suitable for study and reproduction in contract drawings.

Another alternate that is technically, but not economically feasible at this time, is use of a larger version of the oscilloscope arrangement known as a charactron tube. This produces a TV-screen-size non-disappearing plot that contains numerals and letters as well as lines and is attached directly to the computer. Such tubes are now incorporated in the multi-million-dollar SAGE network being built to track hostile aircraft.

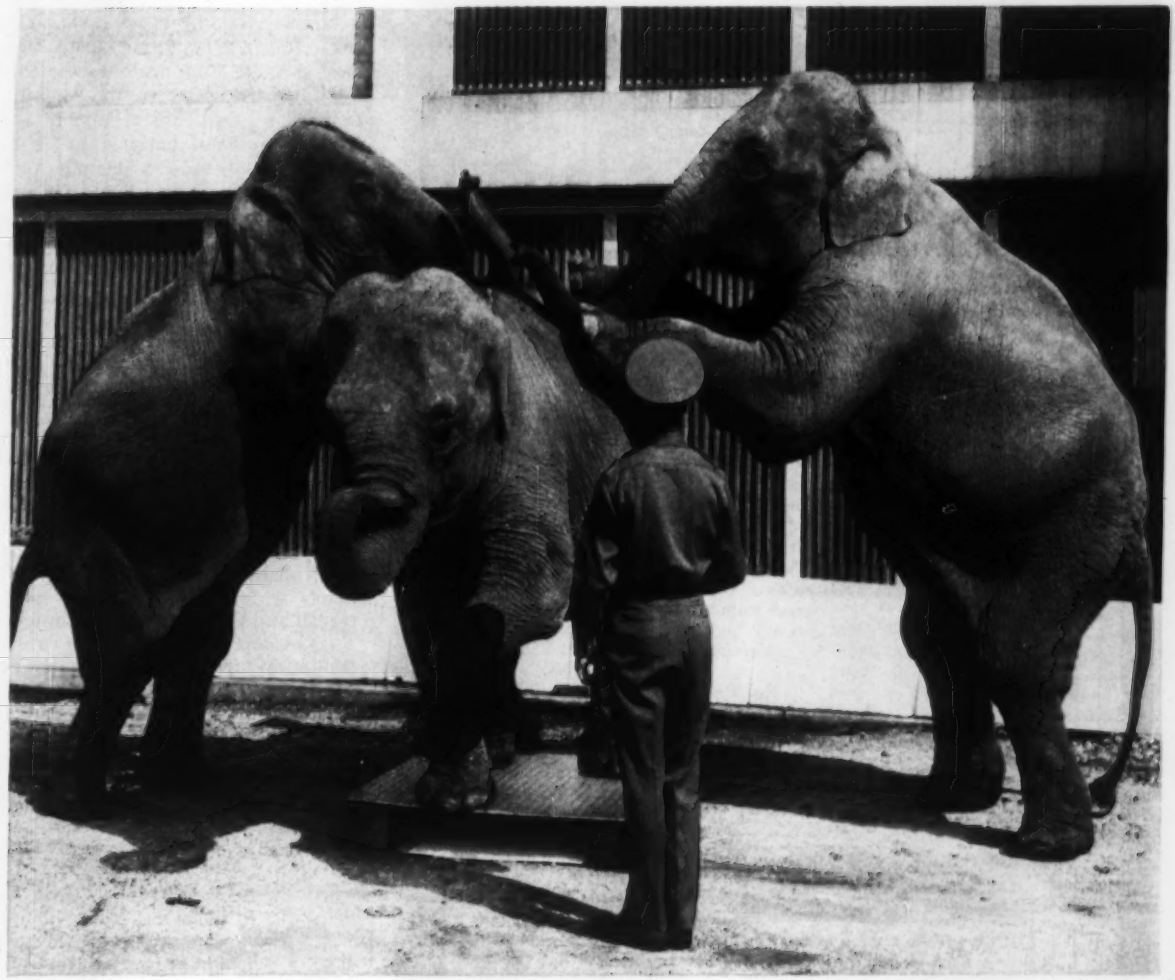
Other changes in details, not fundamentals, are being made frequently. For example, Ohio is considering a smaller machine to substitute for the punch in the automatic recording of Kelsh plotter cross section data.

• **Computer programs**—What actually happens in the electronic computer has been glossed over. Basically, these machines merely add, subtract, multiply, divide, compare numbers and store numbers in accordance with a set of instructions called a program (as described in ENR July 12, 1956, p. 30). These programs in themselves, however, require a major development effort when starting from scratch.

The Ohio method utilizes four programs: (a) profile; (b) superelevation along horizontal curves; (c) design templet; and (d) earthwork volume. The first three were written by Ohio; the last is a modification of a program prepared by the computer manufacturer (International Business Machine Corp.). Ohio is the first to succeed with a design templet program, which is flexible enough to accommodate most any section. As a clue to costs, Ohio figures it spent about $12,000 in programmers' salaries for just this one set of instructions for the computer.

Perhaps the most significant characteristic of the Ohio method is that it is tailored to meet the highway designer's needs; he does not have to rearrange his thinking to fit the requirements of the machinery. Preston along with many others in the field recognizes that cross sections are not particularly necessary in contract drawings, but he feels that they are of vital aid to the designer, particularly for drainage work and adjustment of side slopes.

(*Continued on page 42*)



2-TON BABIES PROVE 4-WAY'S STRUCTURAL STRENGTH

These frolicsome 2-ton circus babies demonstrate the ability of Inland 4-WAY Safety Plate to support tremendous weights. Because of 4-WAY's rugged strength, this 4′ x 4′ plate bears up under 4,000 pounds of pudgy pachyderm without a hint of strain.

The extreme structural strength of Inland 4-WAY Safety Plate is an important factor in plant safety. 4-WAY is not just another flooring surface material, but a steel plate that can be used as a structural member.

Strength, however, is only one of the advantages that 4-WAY offers. Its **slip-resistance, durability, attractive appearance, ease of application, fire resistance, ease of fabrication and cleanability** provide you with a combination of features unequalled by any other materials. Where can *you* use Inland 4-WAY Safety Plate? There are dozens of places in every plant where it can pay off in man hours saved . . . in providing safer, cleaner surfaces . . . in boosting general efficiency. For helpful suggestions and useful information, write to Dick Prendergast, Room 1262.

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THE SURVEYOR'S NOTEBOOK

Reporting on Unusual Surveying Problems and Their Solutions
Notekeeper: W. & L. E. Gurley, Established 1845

A Few "Tricks of the Trade"

Unusual Field Tips Suggested by Readers of "The Surveyor's Notebook"

A Louisiana engineer has come up with an interesting method of locating shot points during seismograph surveys. The shot location was practically inaccessible in the bayous. However, general direction was known from two points on a base. When the shot was sent off, considerable dirt and smoke were blown into the air; and two transits intersected the shot to give location close enough for practical purposes. (*Speaking of inaccessible sights,* the Gurley Telescopic Solar Transit quickly gets around obstructions with sun shots. Procedure of carrying a line forward with a Gurley Solar eliminates one man from a party. The time and labor saved "pay off" the instrument in a few seasons. Write for information on Model 112-RT.)

Gurley Telescopic Solar Transit

* * *

For night work, an automobile spotlight can aid the surveyor greatly. One engineer directs his vertically...uses suspended plumb lines at right angles to each other to plumb the beam. The beam is used for signaling when the transit party is to take the sight...sight is taken on the vertical beam when it appears in the sky.

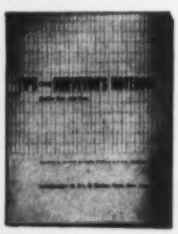
* * *

Some engineers ask for horizontal stadia lines on their transit reticles. This permits use of a horizontal rod—or even a common tape—for measuring distance. Using a right angle prism or Locke hand level with a right angle, a line is laid off perpendicular to the line of sight; and two targets such as pins or range poles are set on this line so that they are exactly matched to horizontal stadia. Distance between the two can then be measured, giving a means of determining stadia distance.

* * *

Can you use these field aids? *Gurley can supply 50-pound test yellow nylon plumb bob cord, to add to the visibility of your string in poor lighting. Also a cord adjustor, which helps you make quick changes in line length in the field. Send 25 cents in stamps or coin for a set of cord and adjustor with a drawing showing how to use them.*

* *



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The beauty of the Ohio method is that it allows major changes to be made in highway alignment and grade almost in the time it takes to talk about them. Preston recalls from his long experience several instances where the engineers knew that a particular section of road was uneconomical but had to let the design stand because a revision would take weeks of office work and the pressure was on to call for bids. It is in alleviating these so-called "practical" difficulties that the new method will shine its brightest.

• **The equipment** – In developing its method, Ohio was fortunate in already having the largest aerial surveying and photogrammetric facilities of any state highway department. In the near future, it will have three of six Kelsh plotters equipped with horizontal measuring devices and counters and either an IBM Model 526 punch or a substitute device. One IBM Model 650 electronic data processing machine (computer) with associated printer, sorter, verifier and collator have been installed. The oscilloscope arrangement utilizes another Model 526 Punch. Rental cost for the IBM equipment, including servicing, runs to $70,000 a year. And the state spent $50,000 in altering a large 30 x 80 ft room to house the computing equipment, this including air conditioning, humidity control, acoustical treatment, electrical service work and a new floor for structural strength.

While Ohio is utilizing IBM's punch card system, the method is equally adaptable to other makes of computers which employ punched tape, magnetic tape or other means for input and output.

• **The organization**—In addition to 12 division offices, the Ohio Department of Highways maintains a design office in Columbus to handle the overflow of work from the divisions. In 1956, this office, not including work for the divisions, processed $28 million of the total $224 million state-engineered work placed under contract (private consultants accounted for another $60 million). In the past, the Columbus office handled the aerial photogrammetry work done by Ohio, and this group will prove out the new Ohio method before it is extended to the field offices.

The method will have its early applications in hilly terrain where the savings are largest. Calculation of pay earthwork quantities by the new method will also be pushed; already Ohio has flown three jobs for final measurements although quantities on these were calculated in the normal manner.

As to the how and who of Ohio's photogrammateric-computer organization, and for what these innovators plan for the future, see page 81 in this issue.

Twenty-five tons in one bite!

This rugged Dravo-built ore unloader works around the clock at Pennsylvania Railroad's Greenwich Point pier in Philadelphia. A specially-designed man trolley operates the 25-ton bucket with the accuracy and speed necessary for efficient unloading.

For Pennsylvania Tidewater Dock Company, operators of the pier, this structure has meant smooth handling and increased capacity. A second ore unloader was ordered six months after the first one was installed.

Many users save time and trouble with Dravo heavy materials handling equipment. You'll find it working at many of the nation's steel plants, power plants, river and coastal depots and at other bulk transfer points. For specific help on such machinery or the other Dravo products and services listed below, write DRAVO CORPORATION, PITTSBURGH 25, PENNSYLVANIA.

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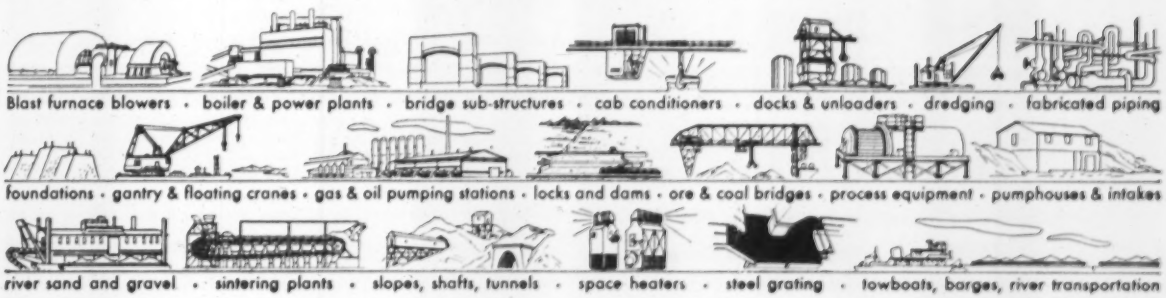
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Copyflex Machines and Sensitized Materials

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Modern Reproduction Machines, Materials, and Techniques Cut

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Six New, Advanced Machines: In just the past 18 months Bruning has introduced six new, greatly improved models—five of which are shown at right. They bring you not only faster reproduction but a host of design improvements that will boost your drafting room output sharply. One of these six new machines will surely meet your exact requirements.

Slash Re-Drafting Time: Your Copyflex machine is more than a means of making conventional opaque prints of finished drawings—it can also help you in your actual drafting operations. In many cases involving the re-working of existing drawings, for instance, it can save you up to 90% in tracing time through the use of translucent prints ("intermediates") made on film, cloth, or low-cost paper. Consider how much of your drafting is devoted to design changes, changes in standards, and similar alterations and you'll see why adding Copyflex to your production team will *add manpower to your drafting room.*

This design change took hours to make because it was done entirely at the drawing board.

The same design change was completed in less than an hour with the aid of a Copyflex intermediate.

These Materials Speed Reproduction *and* Drafting

Copyflex Translucent Sensitized Paper: Prints made on this 100% rag, resin-transparentized medium provide: (1) a positive, reproducible image of all or any selected part of an original; (2) a workable drawing surface for making additions or alterations; and (3) excellent translucency for making fast, sharp reproductions. In the making of design changes, prints made on this paper eliminate the need for tracing those sections of the design which do not require alteration. Unwanted portions can either be masked out in the printing operation or eradicated on the translucent print . . . then new lines added. The paper prints accept pencil and ink, and drawn lines are erasable. Subsequent alterations are achieved just as easily and quickly by use of the same reproduction-drafting technique.

Copyflex Sensitized Matte Film: Usable for same purposes as Copyflex Translucent Sensitized Paper, but is highly transparent and much more durable. Reproduces faster than originals made on tracing paper.

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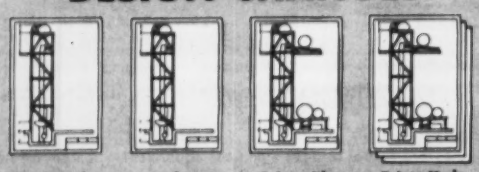
Copyflex Sensitized Tracing Cloth: A top quality moisture repellent cloth with excellent pencil and ink workability. The ideal material to use when circumstances require a translucent print with exceptional durability and strength.

HOW COPYFLEX SPEEDS DESIGN CHANGES



Original Drawing | Translucent Print of Original | Print with Alterations Drawn In | Prints Made from Altered Intermediate

Problem: To make a design change without marking or altering the original drawing or tracing.

Old Method: (1) Trace unchanged parts of the original by hand; (2) draw in the design changes or alterations.

Copyflex Method: (1) Reproduce unchanged parts of the original in a matter of seconds on Copyflex translucent paper, cloth, or film—blocking out or later eradicating any unwanted portions of the original design; (2) draw in the design changes or alterations.

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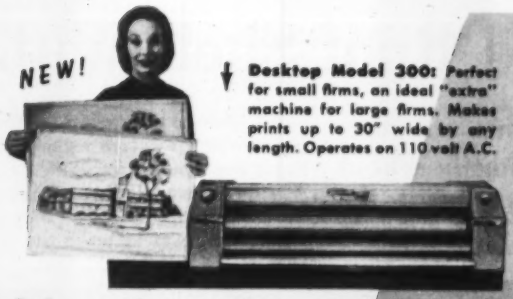

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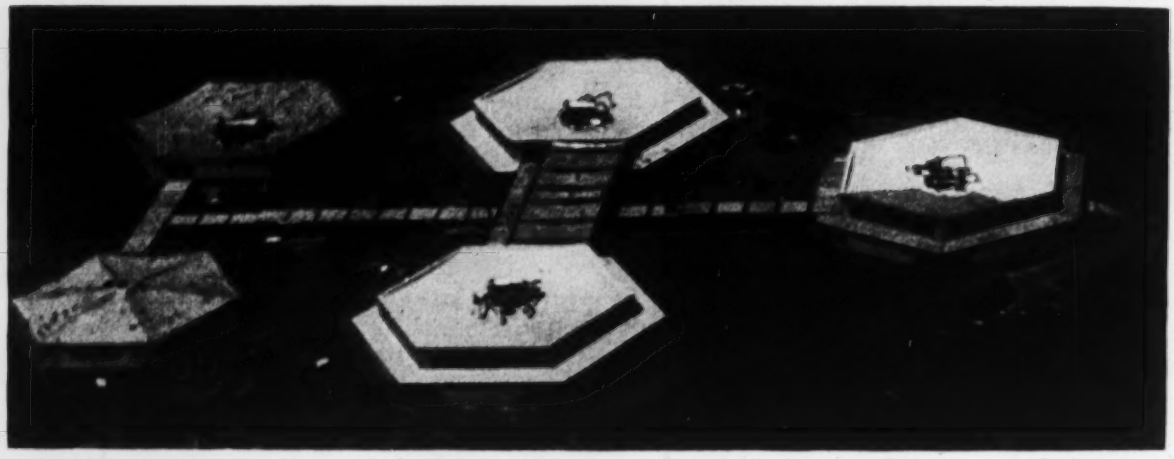
A New Way to Build Roof Shell Without

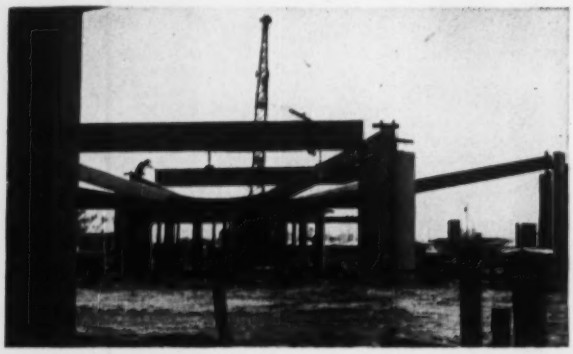
Shell reinforcement, hung between beams, supports the forms for concrete roofs of a California school

It's quite a feat to cast a thin-shell concrete roof in place without shoring. But it was done on five buildings of the Atwater Research Project School, in Atwater, Calif.

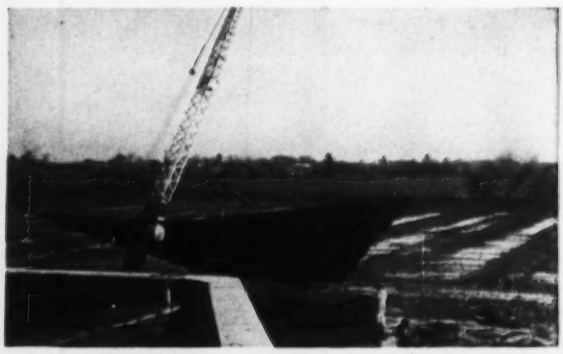
The trick was to make the reinforc-



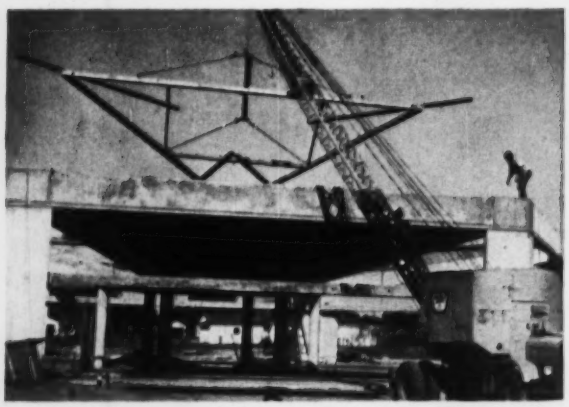
CONCRETE HEXAGONS above are the buildings of Atwater Research Project School, Atwater, Calif. Measuring 74 ft across the flats, they are framed with precast concrete columns and beams and roofed with 2½ in. thick catenary shells of vermiculite concrete.



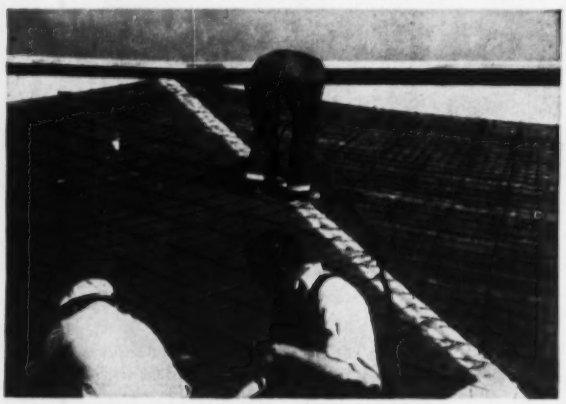
FIRST THE FRAMES of the hexagonal building were constructed from precast concrete columns and beams trucked to the site.



. . . **THEN THE REINFORCEMENT,** prefabricated in mats with paper-backed wire mesh beneath, was hoisted by means of . . .



. . . **LIFTING FRAME** that supported the flexible mats during raising. Between roof beams, sag rods supported mats until . . .



. . . **WELDERS** permanently connected the bar ends to steel inserts set flush with the top surface of the beams.

Falsework

ing steel serve also as formwork. In that capacity it had to have: first, a continuous form surface to retain the wet concrete; and second, strength to support the load.

The first requirement was met by tying paper-backed wire mesh under the bars. The second was met by anchoring the ends of the bars.

Draped in flat catenaries between roof beams and welded to steel inserts in the beams, the reinforcing mats had not only the necessary strength but also enough rigidity to deflect only slightly under the weight of workmen during concreting operations.

• **Six-sided buildings**—Each building is a regular hexagon in plan, measuring 43 ft on a side and 74 ft across the flats. The frame comprises six radial and six perimeter beams, all of precast concrete, supported by concrete corner posts and a concrete post-and-beam core.

• **Mats were prefabbed**—The reinforcing mats were prefabricated on the ground, in sections to fit the individual 60-deg sectors of the roof. Principal bars—$\frac{3}{8}$ in. dia., 9 in. c-c—parallel the side of the building in each sector. Spacer bars—$\frac{1}{4}$ in. diameter, 16 in. c-c—cross the main bars at right angles. The paper-backed mesh—4x3 in. floor lath of 12-ga galvanized wire—was attached with tie wires at bar intersections.

Too flexible to be handled directly by the crane, the mat sections were fastened to a specially devised triangular wood framework on the ground, and the entire assembly was lifted to the roof. The framework kept the mats outstretched during the lifting. In place on the roof structure, the reinforcing steel was temporarily supported by $\frac{5}{8}$ in. sag rods 4 ft c-c between roof beams. Once the ends of the principal bars were welded to the embedded flat bars in the upper surfaces of the radial concrete beams, the sag rods were no longer needed.

• **Concrete pumped to roof**—The vermiculite concrete mix (designed for 500 psi), was pumped through a hose to the roof from a continuous-batching mixer on the ground.

After the $2\frac{1}{2}$ in. roof slab had cured, the top surface was sprayed with a 0.030 in. vinyl plastic roof membrane—a 3-coat hot process. Instead of metal flashing, glass-fiber webbing was used at the intersections of parapet walls and roof. On the underside of the roof, a 1 in. coat of vermiculite plaster was placed pneumatically.

Frame members for the buildings were mostly precast concrete (3,500 psi) with field-welded connections. Flat roof sections (covered passages, for example) and walls were constructed of precast lightweight concrete panels.

Dead load of the catenary roof is 14 psf, and design live load is 20 psf. The roof has a heat-transmission U factor of 0.21 Btu per sq ft per hr per deg F.

• **Cost was low**—The cost of the roof, excluding beams but including plaster and roofing, was $1.26 per sq ft.

Preliminary load tests were conducted by A. J. Hales Laboratories on a 4x30 ft section of the catenary span in accordance with the American Concrete Institute code and California State Division of Architecture requirements.

Engineering design for the project was by Frank Wynkoop, architect, of Carmel, Calif., and his staff engineer assistant Laszlo Toldi. The general contractor was Graham & Jensen, Merced, Calif. Precast members were supplied by P. Grassi, American Terazzo Co., of South San Francisco.

NEXT the concrete was placed. The mix was pumped from ground level to roof.

FINALLY the roofing, a three-coat hot process vinyl membrane, was sprayed on.

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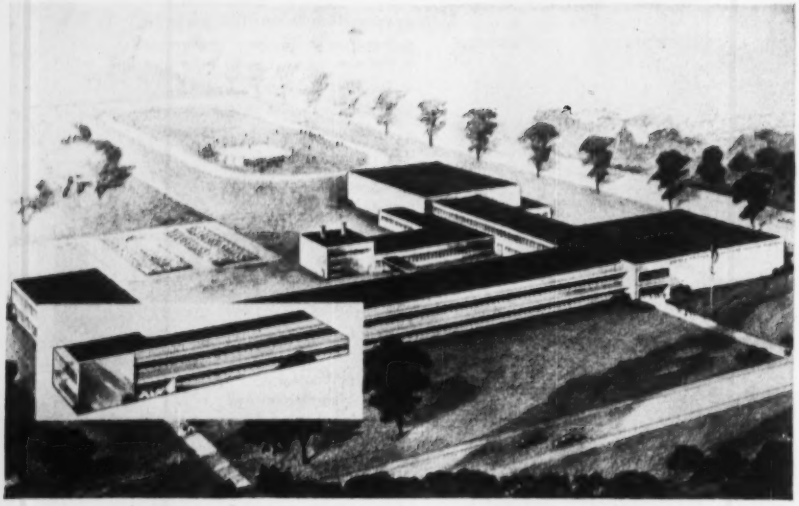
Here's the job where Pittsburgh Steeltex made the substantial saving in the number of days required to prepare for and pour a 2½-inch concrete roof slab, measuring 64 x 220 feet. The project is the Ecorse Elementary School in Trenton, Mich. *Contractor:* The Charlson Company. *Architect:* Giffels & Vallet, Inc., L. Rosetti, Associated Engineers and Architects.

"Steeltex saved 6½ days on 14,000 sq. ft. roof deck"



Architect's aerial perspective of the whole school unit, including the elementary school (shown at left) which was constructed as the first segment of the entire job.

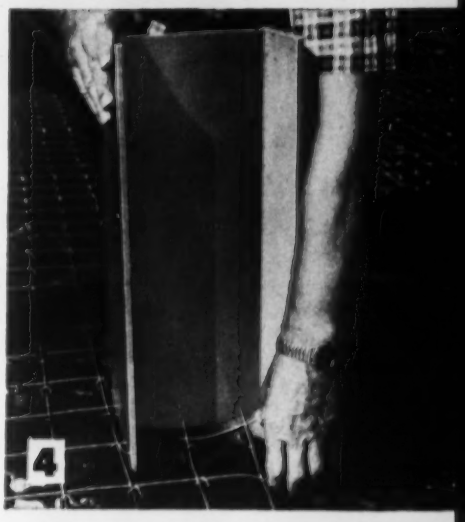
A Michigan contractor saved 6½ days on a school construction job by using Pittsburgh Steel Products' Steeltex Floor Lath.

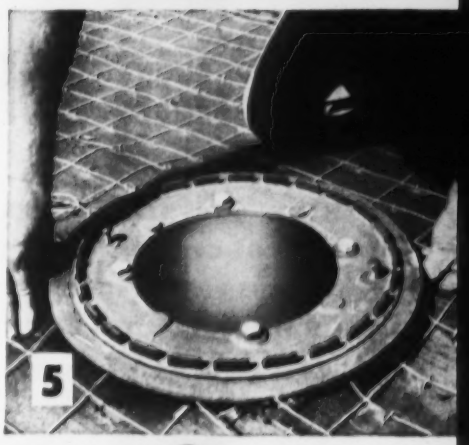
The Charlson Company of Wyandotte, Mich., took only 28 hours to cover the roof area with Steeltex before pouring a 2½-inch concrete slab. The job was complicated by numerous columns and other irregular shaped objects on the roof.

William Johnson, construction superintendent, said use of Pittsburgh Steeltex—the wire mesh reinforcing that carries its form right on its back—permitted his men to start laying the material on a Wednesday morning and complete the job Monday noon, just 3½ days later.

He estimated use of other forms would have taken a good two weeks before concrete could have been poured. The ease with which his men fitted Steeltex around pipes, columns and irregular shaped objects made the

Photographs above and at right show some of Steeltex's money saving advantages. 1. Rods welded to joists eliminate diagonal bridging. Steeltex and concrete give joists lateral stability. 2 and 3. Steeltex, cut and bent easily and quickly, made it possible for one man to cover this special depressed area in a few minutes. John Casey, architectural superintendent, points to neat, finished job. 4. It's easy to fit Steeltex snugly around columns. 5. Round or irregular shapes pose no problems because Steeltex fits snugly, keeps concrete from dripping through.





time savings possible.

To make the achievement even more remarkable, the Charlson men had never before used Pittsburgh Steeltex. But the workmen needed no other instructions than the printed directions which accompany every 125-foot roll.

Steeltex, sold by the Pittsburgh Steel Products Division of Pittsburgh Steel Co., was specified by Giffels & Vallet, Inc., L. Rosetti, Associated Engineers and Architects, of Detroit, Mich.

The specification pleased President K. H. Charlson of the Charlson Company, who said:

"Steeltex definitely was the best choice. It is a good product that is easier to cut and shape than other centering material. The paper backing reduces dripping and eliminates clean-up problems on the floor below.

"Steeltex is economical to buy, saves a lot of costly, time-consuming work and produces a high quality concrete slab with good reinforcing."

The Ecorse Elementary School job calls for the first segment now under construction to become eventually part of a much larger complete school unit, including a high school and a junior high.

Since the elementary school will have a second floor later on, its roof deck will become the floor of the planned second story.

That meant columns for the new roof had to be left protruding from the present roof. These columns offered no problem to Steeltex. It took one workman only a minute or two to cut the mesh and fit it around each column as he came to it.

A long depression in the roof deck (see photographs) had to be left for sanitary facilities on the proposed second floor. One man covered this long gap, measuring more than 20 feet long and two feet wide.

You, too, can reduce costs and pour concrete decks quicker while improving the quality of floors and roofs—when you use Steeltex.

Special advantages of Steeltex can work as well for you as for this Michigan architect and the contractor.

A trained Pittsburgh Steel Products engineer, with lots of construction know-how, is available close at hand. Call him at any of the district sales offices listed here. Do it today.

See Sweet's Catalog Section 2-B

Steeltex®

Pittsburgh Steel Products

a division of **Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

District Sales Offices: Atlanta • Chicago • Cleveland • Columbus • Dallas Dayton • Detroit • Houston • Los Angeles • New York • Philadelphia • Pittsburgh Tulsa • Warren, Ohio

NEW FEATURES—Link-Belt Speeder shovel-cranes offer many important production-increasing advantages including reversing clutches for either or both main drums, a third drum and independent rapid boom hoist for power-raising and power-controlled lowering.

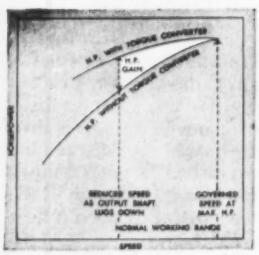
Getting bonus power...extra line pull

Size for size, Link-Belt Speeder shovel-cranes deliver greater usable horsepower than other machines using the same engines

Engine size alone is not a correct measure of a shovel-crane's actual *usable* horsepower. Thus, it's important to know Link-Belt Speeders deliver more *usable* horsepower or line pull at the drums than other machines using the same engine, yet remain well within engine manufacturers' recommended operating speeds.

Why? A Link-Belt Speeder is designed and built with extra size and strength in shafts, gears, clutches and structural members. It has the strength to fully utilize available engine power.

It's another reason why Link-Belt Speeder shovel-cranes are setting entirely new high standards of efficiency. For complete facts, contact your Link-Belt Speeder distributor or write—Link-Belt Speeder Corporation, Cedar Rapids, Iowa. 14.470-B



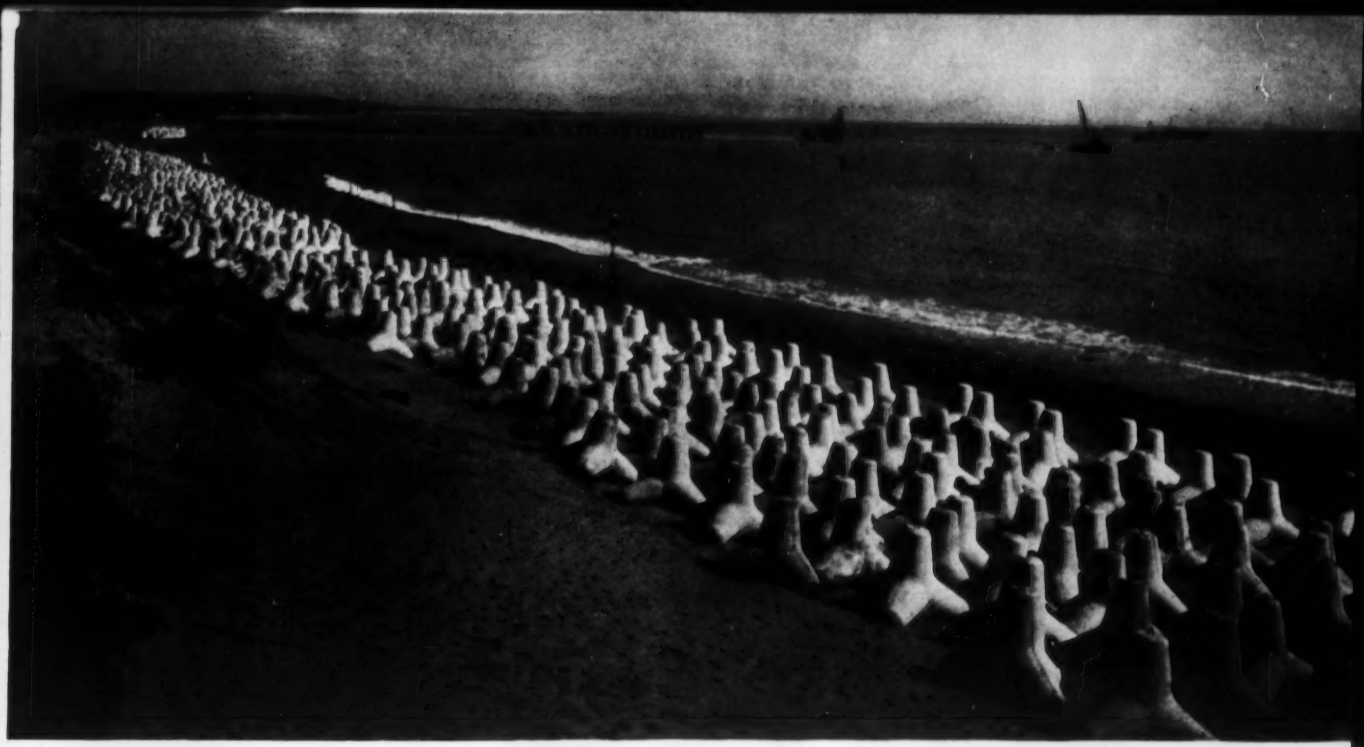
TORQUE CONVERTERS are available for all Link-Belt Speeder models, supply power to match the load . . . provide sustained power, increased line pull to maintain high production even with heavy loads and to handle these big loads smoothly, accurately!

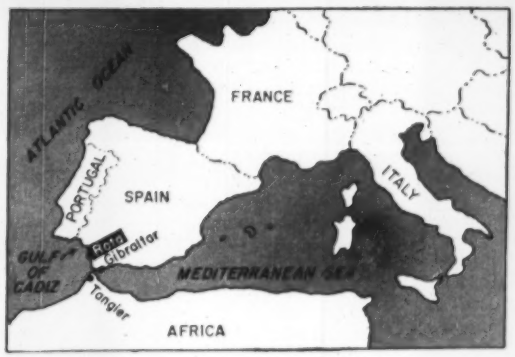
POWER HYDRAULIC CONTROLS are operated with the flick of a finger, provide fast, positive response . . . perfect feel of the load for added safety. They're standard equipment on all crawler and rubber-tired models ½ to 3-yd, 8 to 75-ton capacities.

It's time to compare . . . with

LINK-BELT SPEEDER

Builders of a complete line of shovel-cranes . . . with exclusive Speed-o-Matic power hydraulic controls





Tetrapods, lined up like marching penguins, are stored pending use, as contractors rush to build a new seaport where only a fishing village existed

Rota: Key to U.S. Bases in Spain

Hal W. Hunt
Chief Engineer
Corbetta-Coviles

The U. S. naval base now under construction at Rota on Cadiz Bay in southeastern Spain is primarily a Spanish job—but handled in five languages; it is a backbreaker in long hours; it is a heartbreaker, sometimes, in trying to make equipment operators out of mule skinners; it has been tough to get the organization functioning when translations don't convey the same ideas. But the job is moving.

Harbor construction is the major part of the $65 million project, which will create a sheltered harbor at a site now fully open to Atlantic Ocean storms. A breakwater 1½ miles long is being constructed out to 40 ft depth of water; a 1,000 ft long marginal wharf will berth the largest naval vessels. The whole development is designed for economical expansion to six times the initial installation.

About a mile distant from the marginal wharf, a petroleum, oil and lubricants (POL) pier is under construction. From this pier, pipelines lead to an underground storage tank farm two miles away where more than a million gallons can be stored. From here, aviation fuel, ordinary gasoline and fuel oil will be pumped to new U.S. bases near Seville, Madrid and Zarragoza, as well as supplying the Rota base itself.

Since the Rota base is planned as a major facility to support other bases in Spain, the overall plan includes many other projects. For example, aircraft destined for other bases may be brought in by ship to the marginal wharf, swung ashore by a 50 ton crane and hauled a mile along a "tow-way" to a hangar, to be prepared for flight. An 8,000 ft runway, just completed, will permit flying out most types of aircraft. Space is provided in the layout for a parallel runway and for extension of both runways to 12,000 ft. Space is available also for ammunition storage and for a group of lighter-than-air craft for submarine tracking.

• **Supply own equipment**—Harbor construction at Rota is the job of Corbetta-Coviles, a joint venture of Corbetta Construction Company, Inc. of New York City and Construcciones Coviles

. . . At Rota: Rock is scarce commodity

ROCK LOADS: Some of the breakwater armor will be heavy rock, loaded on trains at quarries miles away, trans-shipped to trucks for placement.

of Madrid. Dredging and placing materials in the sea is subcontracted to Societe Dumez of Paris.

On some of the U. S. work in Spain equipment has been furnished at nominal rates (to Spanish constructors) by the U. S. government. But at Rota Corbetta-Coviles supplies all its own equipment. Included in the more than $6 million worth of machines that has been assembled are: a crane capable of handling 25 tons at 150 ft radius, a gantry to move 110 ton precast concrete blocks half a mile, big derricks, generators for all electrical requirements, and three dredges. There is also a completely equipped machine shop and even a bakery to supply a 400-man camp.

Equipment has come from everywhere; crawler cranes from the U. S. and Germany; a hammerhead crane from France; a concrete plant from England (by way of Owens Falls Dam, South Africa); a 110 ton gantry crane from North Africa; and trucks from France, Germany and the U. S.

Materials handling is the big job on the harbor work. Some 2,750,000 cu yd of mixed clay and sand must be removed by dredging to provide a deep draft harbor. Hydraulic fill is estimated at 1.2 million cu yd to provide water-side work room and storage area in the harbor; nearly 2 million cu yd of rock must be placed in the breakwater; nearly 300,000 tons of precast concrete blocks must be placed in the wharf and (in the form of Tetrapods) on the breakwater; 65,000 cu yd of concrete must be placed on the top of the breakwater.

• **Big problem—find rock**—Rock is the major problem—and transport is the key to the successful solution.

Nearly 2 million tons of rock had to be found, transported and placed in the sea to make protection for the harbor. There is little usable rock in the immediate area, despite some very tough digging for the dredges. Some relatively light weight sandstone (2.3 specific gravity) is available 11 miles from the site, and about a million tons of it is being used for breakwater core material, though it is not acceptable for armor against the sea.

Search throughout the area failed to disclose adequate quantities of hard rock that could be expected to break in sufficiently large pieces for armor of the breakwater against 25 ft high waves. Ninety miles away on the African shore opposite Gibraltar, there is good rock—but storms make barge towing of large quantities impractical for months at a time.

To overcome this lack of large rock, precast concrete tetrapods varying in weight from 8 to 25 tons are planned as the major armor. Carefully placed on the exposed face of the breakwater they can absorb and dissipate wave energy rather than reflect it, and are estimated equivalent in protection to concrete block units more than twice as heavy.

• **Rocky railroad**—Despite the savings that are effected through the use of tetrapods, a total of more than 800,000 tons of dense high quality rock must be procured.

Best source is near the picturesque mountain-top village of Arcos, 45 miles away—but roads for much of the distance are too narrow to allow the big trucks to pass and will not support the heavy loads.

A railroad was available for only 17 miles of the distance, from Rota to Jerez. In the years between 1926 and 1929, the Spanish had started a railroad to Arcos from Jerez, grading was completed, bridges constructed and stations built, but steel was short and no rail was ever laid.

A special agreement was made with the Spanish government and the railroad was completed, with the contractor assisting the construction and financing to be reimbursed out of hauling charges. Big new American Locomotive Company diesels costing over $275,000 each are being supplied by Corbetta-Coviles to haul the rock trains. The locomotives eventually go to the Spanish government railroad in payment of freight.

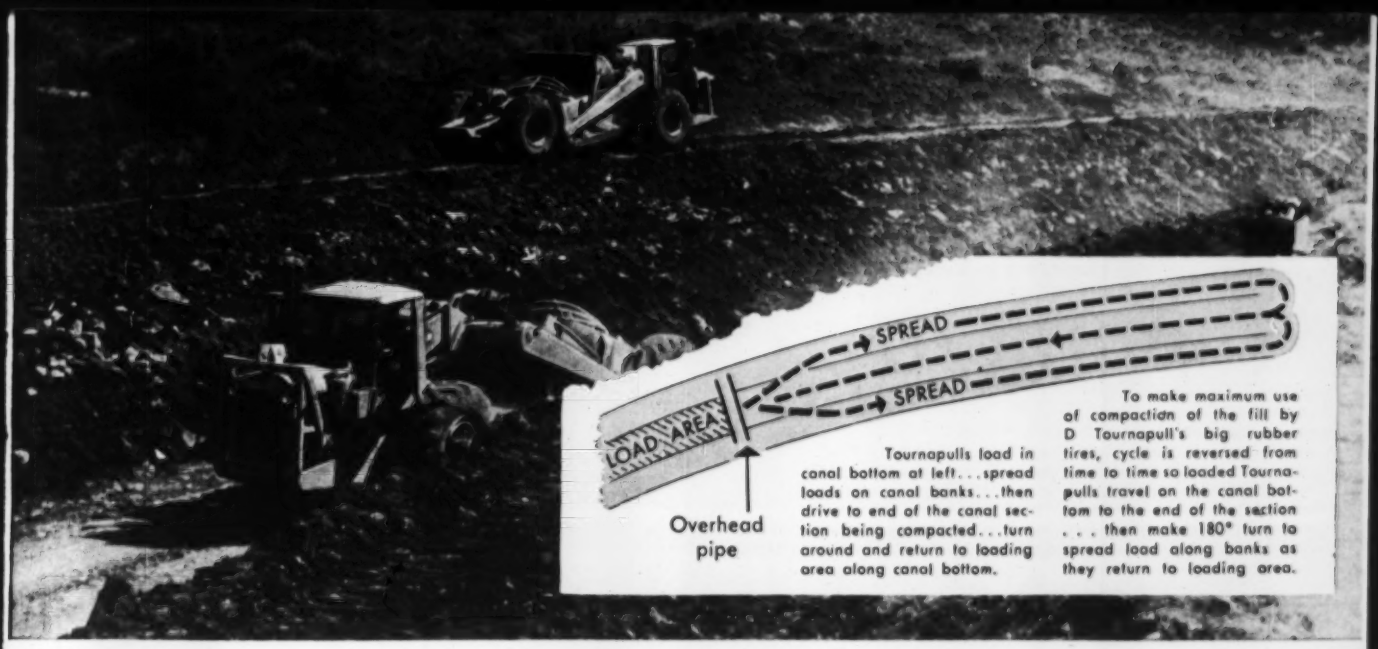
Rail haul is only part of the problem. To reach the quarry, eight miles of existing road had to be widened and surfaced, and an additional three miles of new road built, with heavy grading and a major river crossing.

The river is crossed at a gravel bar using heavy wire mesh "gabions" or baskets to hold the rock and prevent scour under the structure and down stream from it. Waterway is provided by fifty 4-ft dia culverts made from sand and gravel in the river bed with only cement brought in. The crossing will be flooded a few days some years but will be a permanent river crossing for the area where no crossing has existed.

• **From truck to train to truck**—The quarry is being worked in three benches to supply rock weighing up to seven metric tons (7.7 short tons). Cranes load the 2.8 specific gravity rock on to 20 ton trucks for haul to the railhead.

Rock is transferred from the trucks to rail cars by cranes and hauled in trains of up to 36 cars each, to the harbor area. Some of the smaller stone are placed in wire rope slings at the quarry for handling; the slings stay with the rock through transfer from truck to rail to truck until it is deposited in the breakwater, 45 miles away.

At Rota a huge rock yard is provided



Tournapulls load in canal bottom at left...spread loads on canal banks...then drive to end of the canal section being compacted...turn around and return to loading area along canal bottom.

To make maximum use of compaction of the fill by D Tournapull's big rubber tires, cycle is reversed from time to time so loaded Tournapulls travel on the canal bottom to the end of the section . . . then make 180° turn to spread load along banks as they return to loading area.

How Gregerson & Jensen plugged leaks in 1½-mile Utah canal

2 high-speed earthmovers help patch leaks with 150,000 cubic yards of clay in 3 months

To end seepage loss of 200 cubic feet of water per second in an important Utah diversion canal, Gregerson & Jensen, Gunnison, Utah, sent in 2 rubber-tired D Tournapulls and 2 Super C Tournapulls. This U. S. Bureau of Reclamation 1½-mile canal carries water from Weber River to Provo River for storage in the Deer Creek Dam. It normally carries 1000 cubic feet of water per second.

How canal is sealed

Canal was divided into sections and drained. The first section was dug out to increase its bottom width from 24′ to 35′. Clean clay, free from rocks, vegetation, etc., was dug from another section of the canal and spread on the banks of the first section.

After spreading, the "D's" traveled along banks to the end of the section, and then returned along canal bottom to the loading area. Continual travel by the "D's" with their big 18.00 x 25 rubber tires helped to compact build-up of banks and bottom, to make canal water-tight. This procedure was repeated for each section until the entire 1½-mile canal was sealed. Entire project took only 3 months.

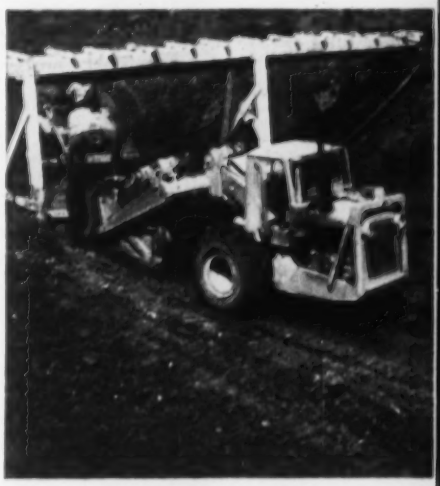
Time-studies on the 150,000-cu. yd. job showed that each D Tournapull averaged 4.52 minutes on a 1600′ cycle. "D's" were push-loaded to average 4.8 yards of clay per load. On this cycle each machine averaged a total of 52.8 yards per 50-min. hour.

D Tournapulls' ability to turn around non-stop in an area only 26′ wide allowed machines to complete cycles fast. Owner says, "I like the maneuverability of the 'D's' best on a job like this. They get around good."

Ask for demonstration

You, too, can solve your dirtmoving problems and make more money with the versatile D Tournapull. The rubber-tired "D" offers you speed, maneuverability, low-cost maintenance and fast job-to-job travel. Gregerson and Jensen drove their "D's" 100 miles, from Brigham City to Kamas, in 5 hours.

Write for complete information. We will be glad to demonstrate the 7-yard "D", 18-yard "C" Fullpak, or 25-yard "B" on your own earthmoving job.



D Tournapull maneuvers under overhead pipe-structure while being push-loaded in 1 minute.

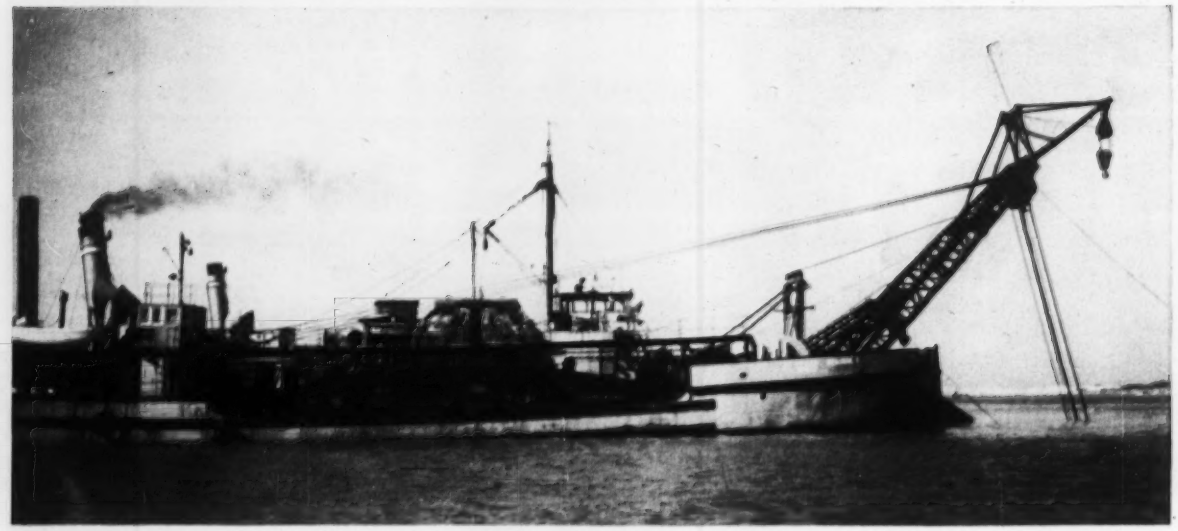
Fullpak—Trademark, Tournapull—Trademark Reg. U.S. Pat. Off. DP-907-D-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

. . . At Rota: Big crane places rock and tetrapods



DREDGING: Cutter-head suction dredge loads self-propelled scows (alongside) for disposal of silt and other material at sea.

with 120 ft boom stiff legged derricks mounted on travelling bogies straddling the railroad track. Two of the stiff-leg derricks are mounted back to back to cover a 90,000 sq ft area. The different sizes of rock are separated in the yard, then shovels and cranes load the rock on trucks again for haul to the breakwater.

On the breakwater, a full revolving hammerhead-type crane with capacity to place 25 tons nearly 150 feet from its base, takes over. It was made especially for this job, in France. This big crane picks up a skip bucket of rock, and puts it in the sea, well ahead of the operation and at the exact spot where needed. First comes the core rock, then the big dense armor rock and tetrapods, all placed in accurately defined layers to specified slopes designed to absorb wave energy.

The crane can pick up its 25 ton load, carry it out 150 feet and return for another load in only three minutes. This rig has its own 360 hp diesel electric generator supplying electricity for lights and for motors that power the hoist, carriage travel, swing and movement of the crane along the rails. The generator is mounted on the crane so there is no problem of trolleys or dragging cables. The entire unit travels on double rails under each side of the crane but because only 20 ft is available for rail width, quickly set outriggers are used for stability whenever the crane is actually working.

• **Tetrapods**—Tetrapods for the armor, more than 9,000 of them, are quite a job to make, store and place. They are required in three sizes: 8, 16 and 25 metric tons for use in successively more exposed areas.

Developed by the Neyrpic Laboratory at Grenoble, France, (ENR Jan. 8, 1953, p. 32) tetrapods have been in use for about seven years, with this project by far the largest installation to date.

The units consist of a central body of four symmetrically spaced truncated conical legs. Since there are virtually no plane surfaces, the blocks have no tendency to slide on one another; the legs encourage interlocking and increase the hydraulic roughness of the face; porosity is always assured.

Casting is easy, it just takes a lot of concrete moved from a nearby mixer plant.

The steel forms are in four identical sections; one section is the base and stays permanently on a concrete bed. The other three sections are moved each day, thoroughly cleaned and set on a different base for another tetrapod. Tetrapods are cast in a circle under a stiff-leg derrick that services two rows of forms, placing the concrete and transferring the steel sections.

Moving the tetrapods is ingenious: First, lifting hooks generally are not used, instead, a lifting frame is employed that requires no inserts in the concrete where rust and salt water might start spalling of the concrete. The frame puts all concrete into compression so that the tetrapod can be moved earlier from the casting bed to make room for another unit.

A Tournacrane (sometimes called a bomber crane because it was developed by the R. G. Le Tourneau Co. in the U.S. to lift and carry huge aircraft) moves the tetrapods around.

A large number of tetrapods have to be made in advance to be ready for placing, thus storage is a big problem. About 4,000 of them must be on hand at one time—but the tetrapods cannot be stacked, and they are shaped so that they take more room than a concrete cube three times the weight.

A lot of land on the base has only small trees on it, but cutting trees is not permitted in wood-starved Spain and disturbing the carefully nutured ground cover encourages a very fine sand to blow, ruining machinery and becoming a real nuisance.

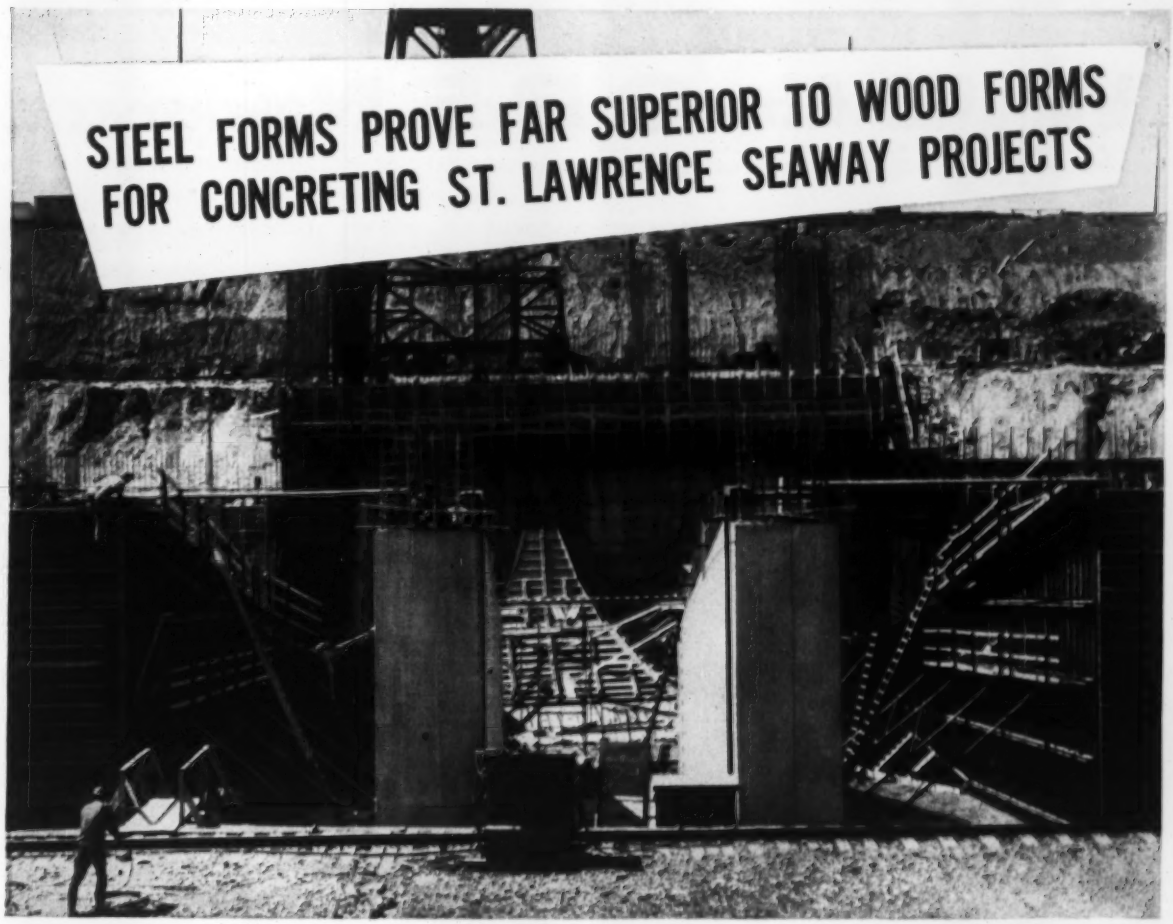
The bomber crane, with big rubber tires, is the answer to storage, for it moves the tetrapods out on the beach or back to any vacant area in a hurry.

• **Central plant concrete**—Concrete for the tetrapods and other needs at the job comes from a British Winget plant with two 2-cu yd tilting mixers and storage capacity for 500 tons of aggregate, cement and pozzolan.

Four sizes of crushed stone (up to 6 in.) and sand for concrete are fed to the mixer plant by a 24 in. wide 250 ft long belt conveyor that rises 95 ft to a distributing turnhead, which feeds each of five compartments for later combining into the required mix for different parts of the work. A supplemental collecting belt operates in a tunnel under a one day supply of aggregates to feed the main belt.

Cement is occasionally delivered in sacks, but generally comes in bulk by ship and is picked up from the ships' holds by a portable Fuller-Kenyon pump. The cement is aerated as it is picked up and blown 300 ft shorewards to a transfer silo. From this point another pump forces cement 1000 ft to storage silos ashore. A screw conveyor takes the cement to a big elevator which delivers to a central compartment

STEEL FORMS PROVE FAR SUPERIOR TO WOOD FORMS FOR CONCRETING ST. LAWRENCE SEAWAY PROJECTS



BLAW-KNOX time and labor-saving STEEL FORMS surpass 12-month wood forms yardage in one summer season!

TWO concreting methods used on the St. Lawrence Seaway Project's Barnhart Island Power Dam showed significant differences between the use of steel forms and wood forms. Working a 12-month season on half of the dam, the contractor using wood forms was well ahead of the contractor responsible for the other half in yardage placed by the spring of '56. Last May, starting a "summer-season" schedule, B. Perini & Sons, Inc. utilized the speed and labor-saving advantages of Blaw-Knox Steel Forms to catch up with *and surpass* the wood forms users in concrete poured before the onset of cold weather last fall.

Here are a few of the reasons why Blaw-Knox Steel Forms have proved to be far superior on the Barnhart Island Power Dam:

- Steel forms mean speed! Perini could get one complete use of each set of steel forms every 3 weeks, as compared to a possible 7-week cycle on the wood forms.
- Piers, walls, roofs and the rear elbows of draft tubes can be formed and poured in low lifts. Forms can be moved quickly along from unit to unit of the dam, in a fast cycle of re-use.
- Designed specifically by experienced Blaw-Knox engineers for the exact configurations and construction joints of this structure, the steel forms saved the time and labor of building wood forms to fit each pouring phase.

Blaw-Knox Steel Forms engineers are backed by over 40 years' practical experience in solving concreting problems on dozens of big projects such as Chief Joseph Dam and The Dalles project, as well as many of the other lock and dam structures of the St. Lawrence Seaway. *You can put that experience to work for you.* Whether your job is a big dam, tunnel, bridge, or small sewer, be sure to call in the Blaw-Knox Steel Forms Consultation Service in the preliminary planning stage for the simplified, fast forming that increases your profits by reducing time and labor costs.

BLAW-KNOX COMPANY

STEEL FORMS DEPARTMENT • BLAW-KNOX EQUIPMENT DIVISION

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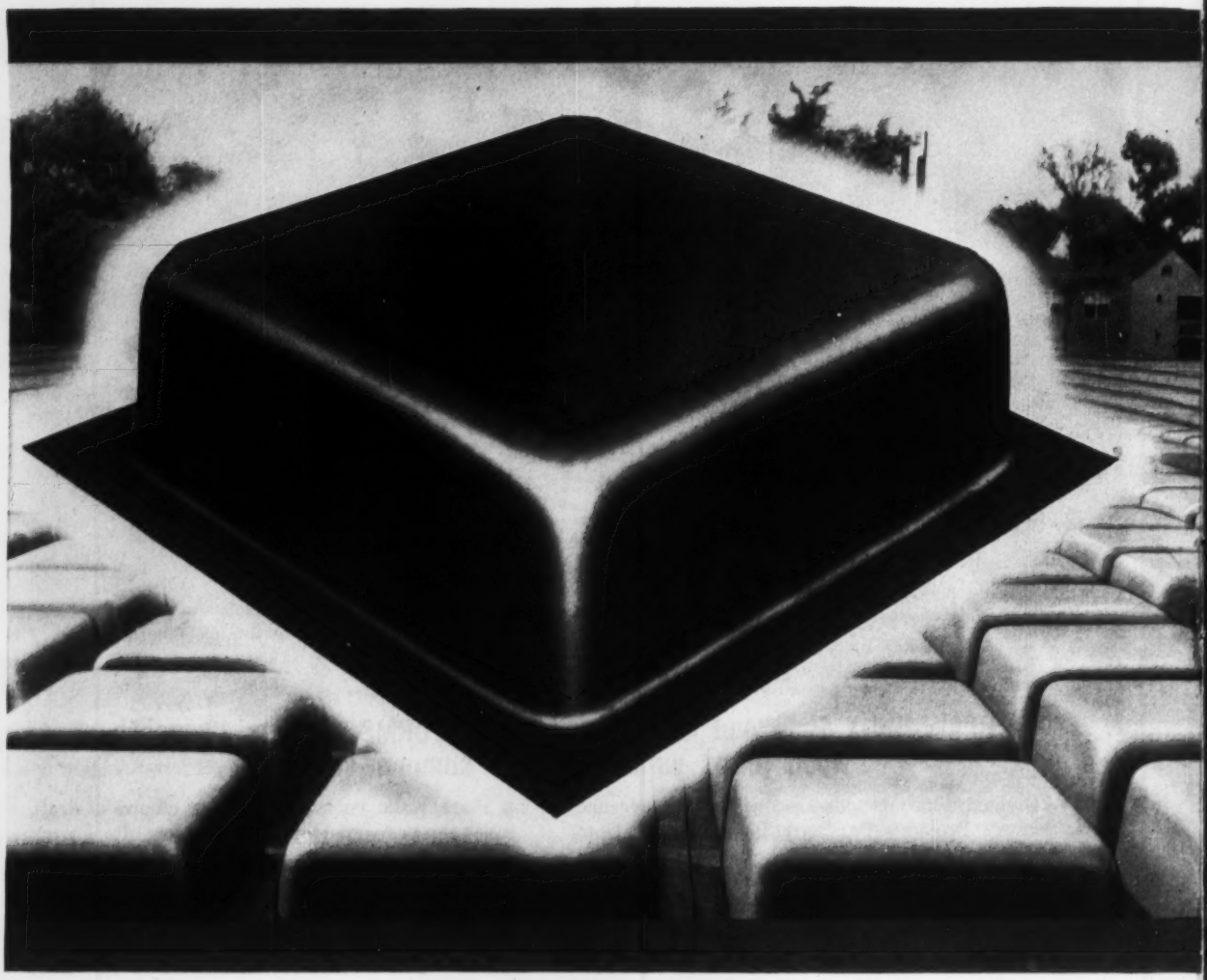
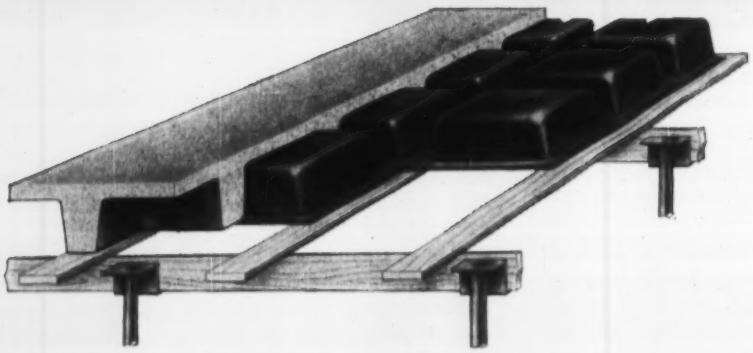
BLAW-KNOX STEEL FORMS CONSULTATION SERVICE

WIDE OPEN *SPACES...*





Showing how Steeldomes are used in forming waffle-type (two-way) concrete joist construction. Steeldomes are rigid, deep-drawn, one-piece units. Flanges forming standard-width joist soffits are an integral part of the Steeldomes. When erected Steeldomes are butted at all soffit joints, and eliminate the common defects of forms which must be lapped. Wide column spacings for open floor areas are easily achieved, because of (a) the basic economy of two-way construction, and (b) the saving of dead-load through use of a joist framing system. Story heights are decreased by the elimination of deep beams. Standard Steeldomes have a void of 30" x 30" and an overall plan size of 36" x 36" including flanges. Standard depths are 8", 10", 12", and 14".

WITH ECONOMY...FOR TODAY'S CONSTRUCTION

...ALL MADE POSSIBLE WITH THE NEW CECO-MEYER ONE-PIECE STEELDOME METHOD OF FORMING WAFFLE-TYPE CONCRETE JOIST FLOOR SYSTEMS

Maximum use of floor space is a must in today's functional buildings. And the most practical way to design wide open floor areas . . . with no projecting beams . . . is by using waffle-type concrete joist construction formed with Ceco-Meyer one-piece Steeldomes. The new Ceco method is the most economical way of forming waffle-type concrete joist construction. In most cases you save up to 30% in materials . . . up to 40% in floor weight compared with the use of flat plate. Besides saving money, labor and materials, Ceco Steeldomes form smooth concrete surfaces for exposed ceilings of high quality finish—pleasing waffle-pattern design at no extra cost. R/C duct underfloor electrification may be readily installed—and pipes, ducts and other mechanical equipment can be located without interference of projecting beams. In planning your next building project, call in your Ceco product specialists.

CECO STEEL PRODUCTS CORPORATION

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IN CONSTRUCTION PRODUCTS CECO ENGINEERING MAKES THE BIG DIFFERENCE

Ceco-Meyer Steelforms / Concrete Reinforcing / Steel Joists / Metal Roof Deck / Windows, Screens and Doors / Metal Lath

CECO STEEL

"CREATIVE ENGINEERING" BY CECO—with a variety of building methods and products to meet any design problem. See CECO in the early planning stage for Steel or Concrete Joist Floor Systems—the most economical underfloor electrification—the widest line of Steel and Aluminum Windows and Curtainwalls. All will help you achieve individuality in building design. And at CECO construction materials and services can fit the tightest budget.

CECO STEEL PRODUCTS CORPORATION
5601 West 26th Street, Chicago 50, Illinois

Please send me your descriptive bulletin on Ceco Steeldomes, No. 4006.

Name_____

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City_____ State_____

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Case History #139
Ridgewood, New Jersey, Contractor Reports:
"CONCRETE FORM ERECTION COSTS CUT 47% WITH ROCFORM SYSTEMS"

on the erection of 'Nike Sites' for the United States Government under the direction of the Corps of Engineers, U. S. Army.

We were able to reduce our erection costs by 47% less than they formerly were when we used a less advanced forming method that employed snaptys, 4' x 8' panels, and 2 x 4, 2 x 6 walers, strongbacks, etc. In addition to these savings, Rocform Systems eliminate 90% of standard bracing, strongbacking and all tie rod and hardware expense.

These savings aid us materially in obtaining new construction jobs.

Yours very truly,
CRETE CONCRETE CORPORATION
Peter J. Soldano

Exterior view of Rocform systems as used in the construction of "Nike Sites" at Springvalley, New York. Note total absence of bracing timbers, strongbacking and wood walers.

COST-CUTTING FEATURES OF ROCFORM SYSTEMS

- All metal walers
- All hardware is guaranteed and replaced without charge when necessary
- No snaptys
- Eliminates 90% of standard bracing and strongbacking
- Reduces erection costs as much as 50%
- Gives up to 300 pours and more before reconditioning is required
- Patented clamping device eliminates nailing
- Extreme versatility makes Rocforms easily adaptable to any concrete forming job
- Reusable, heavy-duty tie rods
- Extreme handling ease reduces labor costs to an absolute minimum

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DEPARTMENT EN-3
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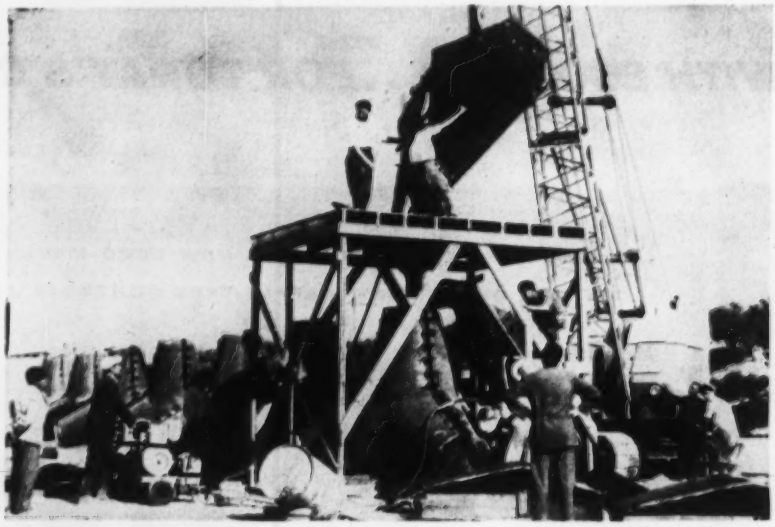
WORLD'S LEADING PRODUCER OF CONCRETE FORMS

IMPORTANT! Rocform Systems can be used with equal ease for Commercial, Industrial or Residential work.

. . . At Rota: Wharf is huge concrete blocks



CASTING: About 9,000 tetrapods, varying from 8 to 25 tons in weight, are cast to provide armor. Forms come in sections for easy erection and stripping

in the mixer plant. A similar compartment holds pozzolan, which is handled through the same system. But both cement and pozzolan can be handled in bags (for extra storage) with the bags being dumped over the screw conveyor when needed.

All materials for concrete are proportioned by weight through hoppers under the bin and flow to one or the other of the 2 cu yd tilting mixers. Concrete is discharged into a hopper that feeds 4 cu yd at a time into trucks for haul to point of placing.

• **Wharf details**—Protected from Atlantic storms by the breakwater, a marginal wharf is being constructed of heavy concrete blocks to provide dock space for the largest naval vessels, with 40 ft depth of water available when planned dredging is completed.

A 350-ft wide space between the marginal wharf and the breakwater gives plenty of room for dock-side storage. A fifty-ton crane on a high gantry will be available to unload ships.

Precasting and placing of concrete for the marginal wharf is a major project.

Blocks up to 110 tons in weight must be precast, transported to storage areas and then loaded on barges for placing by water equipment. Original design called for 2,485 blocks of 35 to 60 tons weight to be used, but to speed up the work, Corbetta-Coviles proposed use of blocks up to 110 tons, thus reducing the total number required to 1,359. The larger blocks required larger and much more expensive equipment for casting and for placing but, with fewer blocks to set, an initial slow start can be overcome.

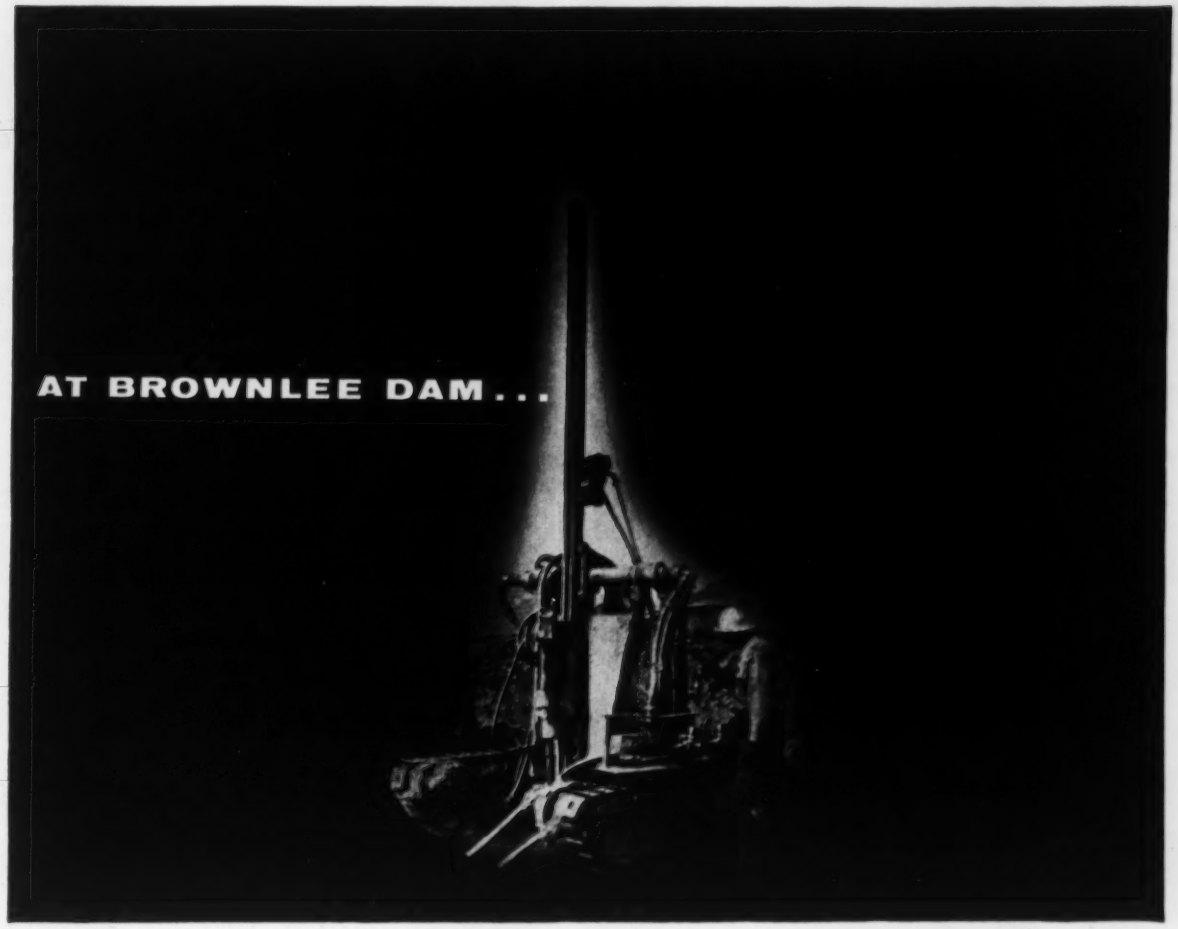
The big piece of land equipment for this precasting job is an 82-ft. span gantry crane that will pick up a 110 ton block anywhere under its span, travel with it at 30 ft. per minute and deliver it in the center of a barge, 25 ft. outside the span of the gantry.

Blocks are cast under the clear span of the gantry in steel forms. These forms are very accurately made, for specifications require that blocks 8 x 11 x 18 ft. be cast and put in location within a tolerance of ¾ in. in any direction. Casting is done on a prepared concrete base with forms built rigidly so that they do not require interior ties. They are simple so they can be stripped, moved and reset quickly, to be filled each day. After a few days the blocks are moved to a storage area where they are stacked to await use.

The gantry can also shift forms. Crawler cranes will supplement the gantry on block construction as the casting schedule requires.

The area in which the block-built wharf will stand must first be dredged to a depth of 50 ft and backfilled with stone, then very accurately levelled to make a firm base for the extremely heavy structure, which will be more than 60 ft. high. A porous fill to be placed back of the wharf, plus the pull from a moored ship, gives a theoretical load of four tons per square foot. Since the natural soil is a sandy silt, with low supporting capacity, every precaution must be taken to keep the load uniform by accurately levelling the base with crushed stone or with slow setting cement in sacks placed just ahead of the blocks so it spreads a little and forms a firm support under the load.

The blocks themselves will be placed



A VARIED SCHEDULE . . . A VERSATILE DRILL

THE *Joy* JUNIOR CHALLENGER

Monday	**10:30 a.m.**	Drilled 4 vertical holes—26′ deep finished by 12:15 p.m.
	1:00 p.m.	Moved to lower level . . . drilled one hole 22′ deep, 3″ diameter.
	2:00 p.m.	Moved drill to high ground to drill horizontal holes.
	4:00 p.m.	Drilled 2 horizontal holes in shattered rock at high location . . . 2′, deep—finished 5:00 p.m. Quit for blasting.
Tuesday	**7:00 a.m.**	Moved to lower level. Began drilling 4″ dia. angled holes beside other drills drilling 2⅞″ dia. holes. Other drills pulled off location for inability to penetrate clay in a water course at 15′. Drilled 11 holes, 24′ deep, in 6½ hours of 9-hour shift.
	Everyday:	The Challenger drills anywhere, in any position, in any formation . . . and stays on the job. This particular machine runs 20 hours a day, 6 days a week and averages 540 feet of 3″ hole per day. Get complete details on the Junior Challenger from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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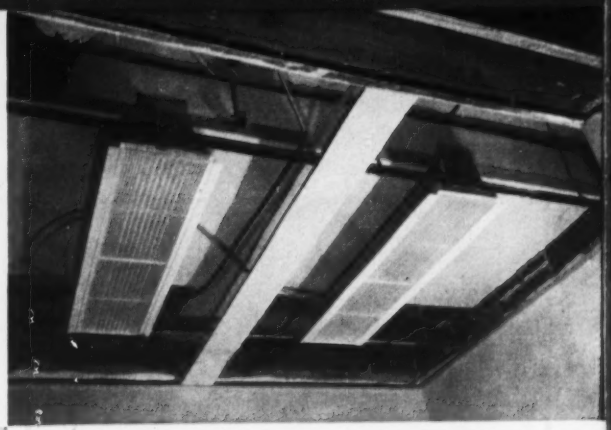
*REG. U. S. PAT. OFF.



Construction view showing how light fixtures can be repositioned after installation to run parallel to the Acousti-Line Panels or at right angles as shown below.

Office in Indiana Building, Indianapolis, Indiana, showing ceiling installation of Acousti-Celotex Perforated Mineral Fiber Tile on the Structural Acousti-Line Suspension System. **Architect:** D. A. Bohlen & Son. **Acousti-Celotex Contractor:** Hugh J. Baker & Company.

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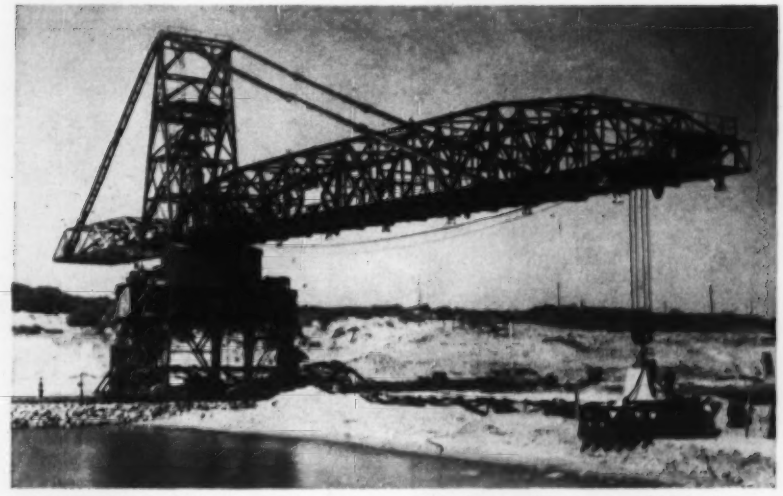
. . . At Rota: Oil pier is major job



HAMMERHEAD CRANE, built on the job, can handle 27 tons at 150-ft radius, moves on its own tracks to place material on breakwater.

by a floating derrick capable of lifting and setting the largest units without excessive tilting of the barge. Heavy frames attached to the blocks and extending to the surface will indicate the position underwater and aid placing to the accurate alignment required.

Blocks are interlocked and placed with staggered joints to key the entire wharf into a unit. Reinforcing steel protruding from the top of the upper blocks is integrated into a cast-in-place utility gallery to completely unify the wharf structure and distribute the bollard pull of a moored ship.

• **Crown wall**—Another big job is 65,000 cu. yd. of concrete to be cast into a crown wall on the breakwater.

This operation must be coordinated with placing the breakwater rock and tetrapods, because the heavy tetrapod units must be set up to half the height of the wall after it is concreted and stripped, but while the placing area is still within reasonable travel of the hammerhead crane. The crown wall is to be nearly 1½ miles long and will have three major changes in cross section as it extends outward over deeper water areas where wave action will be more severe. For 3,700 ft. the wall is about 10 ft. wide by 20 ft. high; then widens to 11.5 ft. for an additional 1,500 ft. and finally enlarges to 16 ft. wide by 30 ft. high for the outer 1,800 ft.

Hand-moved steel panels will be used as forms for part of the work but most of the wall will be built with a rigid frame traveling gantry that requires no cross ties.

• **Pier for tankers**—Construction of the POL pier is handled as a separate job. The pier is to be a steel-pile supported concrete deck structure, accommodating two 40 ft draft, 60 ft long tankers and an additional 20 ft draft barge. Pipelines lead from the pier to a nearby underground tank farm where 1.2 million gal of products can be stored.

The steel H-piling will carry the deck more than 60 ft. above the dredged level of the harbor. Piles are 12 in. 53 lb per ft with 14 in., 73 lb. used in deep water. The pile driver is job-assembled from a 65 ft. Woodfield (English) frame, with swinging 85 ft leads added to permit driving batters up to 1:3 from the vertical. The driver is barge-mounted, with single-acting 26,000 ft. lb. hammer.

Rock underlies part of the area where piles have to be driven, but to date the heavy hammer has forced adequate penetration for stability. Some piles are designed for a 1:2½ batter, in a direction not practical with the regular driver; these are driven with a hammer in a sling while the piles are positioned by a timber frame.

Designs call for a concrete jacket to prevent corrosion above the low water level for leaving steel jacket forms in place. Thin sheet steel is bent into "cans" on the job, with a closure plate at the bottom that has an H cut out of it a little larger than the pile. For convenient handling, a piece of reinforcing steel bent into an inverted U has its ends welded to the closure plate, its looped end hanging over the pile.

The "can" and a required reinforcing steel cage are set by means of a floating derrick and concrete placed by tremie methods.

The superstructure of the pier is a concrete frame with a deck over only part of the structure, the rest being

On jobs like famed Parklabrea housing project, users report . . .

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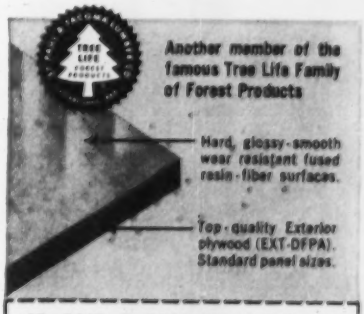
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PRECISION CONTROLS

. . . At Rota: Language is construction problem

MACHINE SHOP runs in four languages (English, French, German and Spanish) acts also as a training school to produce native mechanics.

used for pipe lines. On the access structure, over shallow water, a roadway takes up 14 ft of the 39 ft width. In some areas precast slabs cover the pipe trench to provide a full surface.

• **Problem in logistics**—The telephone doesn't work very well—one telephone line to the outside is shared by all working on the base. And even if the telephone service were adequate there is no supply of anything you need, anyway. So the Spanish idea of making what you want on the job had to be adopted. A machine shop, which turns out anything from small bolts to fabricated tanks for cement storage, operates two shifts every day.

Equipment maintenance is a major problem of course—all nine cranes must work every day. Spanish personnel must be used for almost all of the work, so there has been a job of quickly training operators. Unlike the U. S. where a man may work for a few years as an oiler before he operates the crane, a Spanish operator may have started almost from scratch on this job. So things have happened that you never hear of in the U. S.

But, careless or inept operators have been weeded out, there has been an opportunity to educate oilers gradually to become relief operators and the situation is improving rapidly. The Harnischfaeger Corporation has cooperated to make available Spanish speaking Nicholas Rodgers as trainer and trouble-shooter on the cranes.

Keeping trucks moving on the heavy rock haul is solved by a very strict travel control and maintenance routine backed by adequate record of all operations. Each truck has a recording speedometer that shows travel speed, total travel, waiting time and the like. These are collected and studied after each shift —and they have ended stops at sidewalk cafes, since the record indicates exactly where along the line any stop is made. Of greater importance, the cards serve as control for routine maintenance: Each truck is washed and completely greased on a regular schedule. Manufacturers of Somua trucks (French) and Henschels (West Germany) have cooperated by keeping experienced mechanics on the work full time to assist in maintenance of the equipment and to expedite repairs.

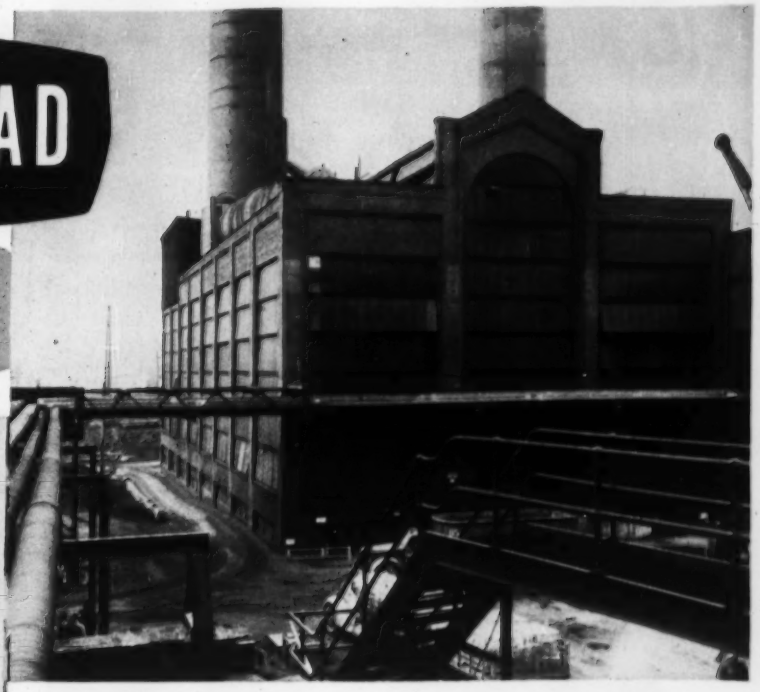
An adequate supply of skilled and semi-skilled workmen didn't exist in Andalucia and to attract workmen it has been necessary to provide living quarters. Families generally have been provided for in structures similar to Quonsets but made of concrete. Construction is simple: (1) pipe curved in an arch is set up at about 7 ft. centers, (2) burlap is draped over the pipe, sagged to make corrugations, (3) 1 inch of mortar is trowelled on or applied by a pneumatic gun, (4) a "chicken-wire" mesh is laid over the first coat of mortar and another coat applied, (5) window and door openings are left and framed in with wood, (6) a locally available split reed is attached with wires and plastered to make the interior surface. Houses have a 20 x 30 ft. floor plan, usually with three bedrooms.

Similar structures, 26 x 92 ft. in plan, house 24 skilled or clerical work-

OVERHEAD

OR

underground



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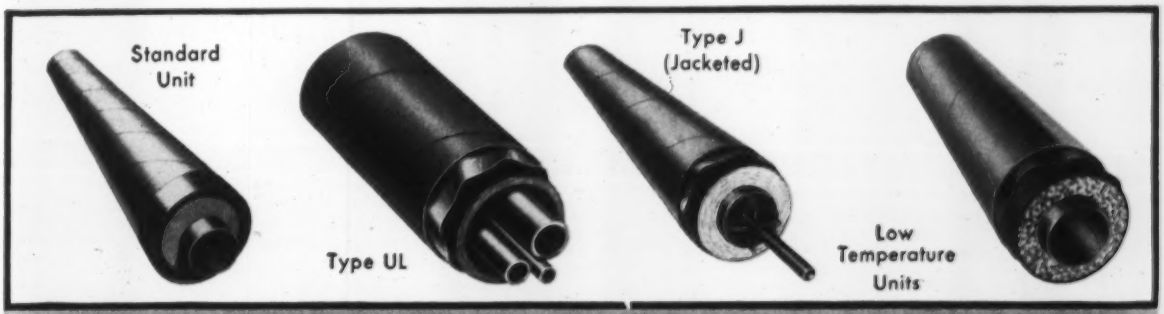
Ric-wiL factory prefabricated piping systems, *timed* to your schedule and *shipped* directly to the job site, can save you valuable time and money. Insulated units are available for steam, hot water, oil, other viscous fluids, process liquids and refrigeration lines . . . and remember . . . Ric-wiL is the quality system of exceptionally high mechanical strength and thermal efficiency.



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. . . of Exceptionally High Thermal Efficiency

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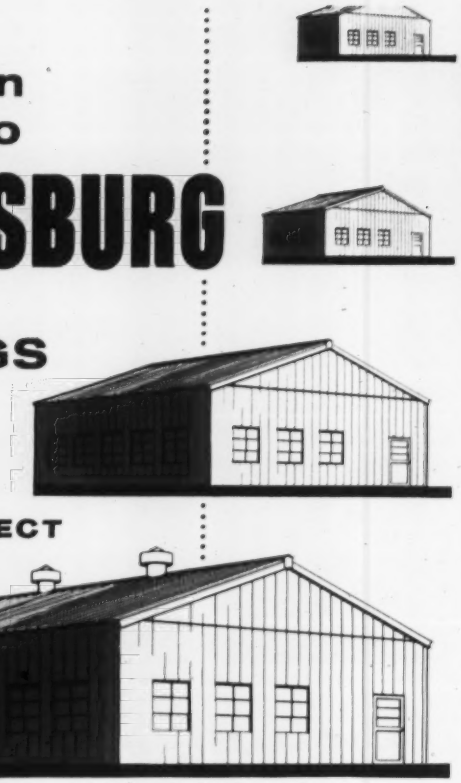

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BUILDING PARKERSBURG DIVISION

BIG THREE when job started were partners Jose Toran Palaez (left) and Roger H. Corbetta, and J. J. Collins.

ers each, while some prefabricated metal and wood buildings house semi-skilled men. A large Quonset serves as mess hall for 300 men. A "posada", or country inn, provides on-site housing for top single personnel and for visitors.

The "posada" contains 22 rooms with connecting baths, and five large bedrooms with private baths. There is a typically American "snack bar" on the lower floor level, over which is a spacious, modern dining room with a capacity for feeding 150 people at a time.

• **Supervision**—Work on all of the Spanish bases is under the direction of the Joint United States Military Group, headed by Major General A. W. Kissner. Construction in Spain is supervised by the U. S. Navy Bureau of Yards and Docks, headed by Rear Admiral R. H. Meade, Chief of the Bureau. Captain W. C. G. Church is the officer in charge of construction.

Design of the harbor at Rota was handled by Architects Engineers Spanish Bases. Four U. S. firms compose the design group. They are Shaw Metz & Dolio, Metcalf & Eddy, Frederic R. Harris, Inc., and Pereira & Luckman. Detail plans were made by a Spanish firm, Estudios Tecnicos Urquijo of Madrid.

Construction is supervised by Brown-Raymond-Walsh under general direction of J. J. Collins, H. N. Hockensmith, M. Shanley and R. E. Barber. At Rota, P. L. Hamilton is Project Manager and S. E. Bradford is Chief Engineer. The Navy Bureau of Yards and Docks is represented at Rota by Commander R. C. Gordon.

Corbetta-Coviles' work is directed by Jose Toran Pelaez, Spanish partner, and Roderick M. Hand, Project Manager. The writer is chief engineer; R. O. Camozzi is mining engineer in charge of the quarries, and Raymond Juan Aporta is Spanish-American Coordinator with Louis P. Corbetta in residence.

from foundry to finished product...

Quality first

Quality, above all things, is the guide for Mueller manufacturing operations and the standard by which all Mueller products are made.

From raw materials in the foundry to final inspection before shipping, highest quality in workmanship, materials and design are united to form a superior product that will serve *dependably* through the years.

Mueller Co. was founded with a tradition of "Quality and Dependability"—a tradition that has been rigidly maintained through a century of service!

A huge vertical boring mill faces the bottom by-pass of a 30" gate valve hub end body. Precise machinery produces precise products.

A lock nut of a Lub-O-Seal meter stop is adjusted to a specified tightness by this assemblyman using a torque gauge.

Each day, incoming raw materials are analyzed by laboratory testing to insure rigid adherence to industry standards.

Performance
in the making

Skilled Mueller craftsmen use lengthy experience, careful training and modern machine tools to produce water and gas products that give superior performance to you—the user...and their work is proved by many rigid inspections and exacting tests.

IN THE FOUNDRIES

Sands are graded, tempered and treated to assure perfect molds from patterns and core boxes fashioned by skilled artisans in the pattern shop of Mueller Co.

Six modern iron and brass foundries feed rich, creamy, carefully-analyzed molten-metal to hungry molds for castings that will become curb or corporation stop bodies, curb boxes and other Mueller products. The castings are thoroughly inspected before moving on to the modern machine shops.

IN THE MACHINE SHOPS

Precise machine tools, operated by expert machinists, cut, turn, bore, grind, thread and work the castings into precision parts. Extremely close tolerances insure perfect mating of component parts and long-lived operating ease.

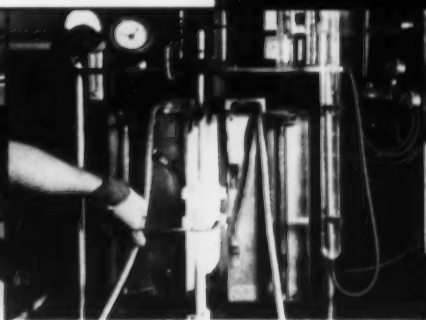
Machined parts are inspected with precise instruments, ranging from micrometers to microscopes, to assure accuracy of each piece.

IN ASSEMBLY

Individual parts are brought together for assembling by proficient craftsmen. These men prepare the finished product to detailed specifications, with each step checked by the ever-critical inspectors, making sure that the required perfection has been attained.

Each Mueller craftsman is instilled with the need for dependable, long-lived equipment in the essential gas and water industry...each does his part to create a product that will fulfill that need. Superior performance is the product of Mueller Co.

Exacting specifications are established by experienced engineers who know customer requirements and material qualities.

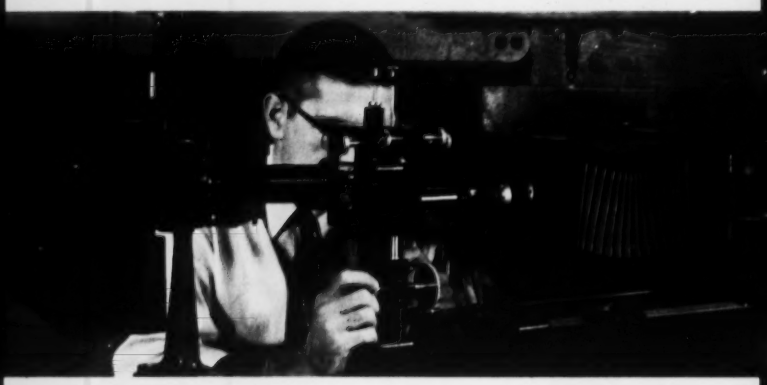


Molding sands are checked by a technician for compressive strength, permeability, moisture content and density, assuring flawless castings.

A semi-automatic machine cuts and threads both ends of a curb stop simultaneously to prevent distortion and damage.

Surface smoothness and contour is revealed by a Profilometer, a precise instrument that helps a corps of inspectors in their work.

This optical device gives a greatly enlarged picture of the contour of tools, gauges and products. Rigid tolerances are easily maintained.



The microstructure of raw materials and metal in products are inspected under extreme magnification in the metallograph.

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The call of the shipping foreman starts Mueller products to every section of the country...starts the products to work where they can prove that their built-in quality means uninterrupted service for vital gas and water industries. The efficient, long-lasting service provided by Mueller products at work, presents ample proof that quality in design and manufacture pays off:

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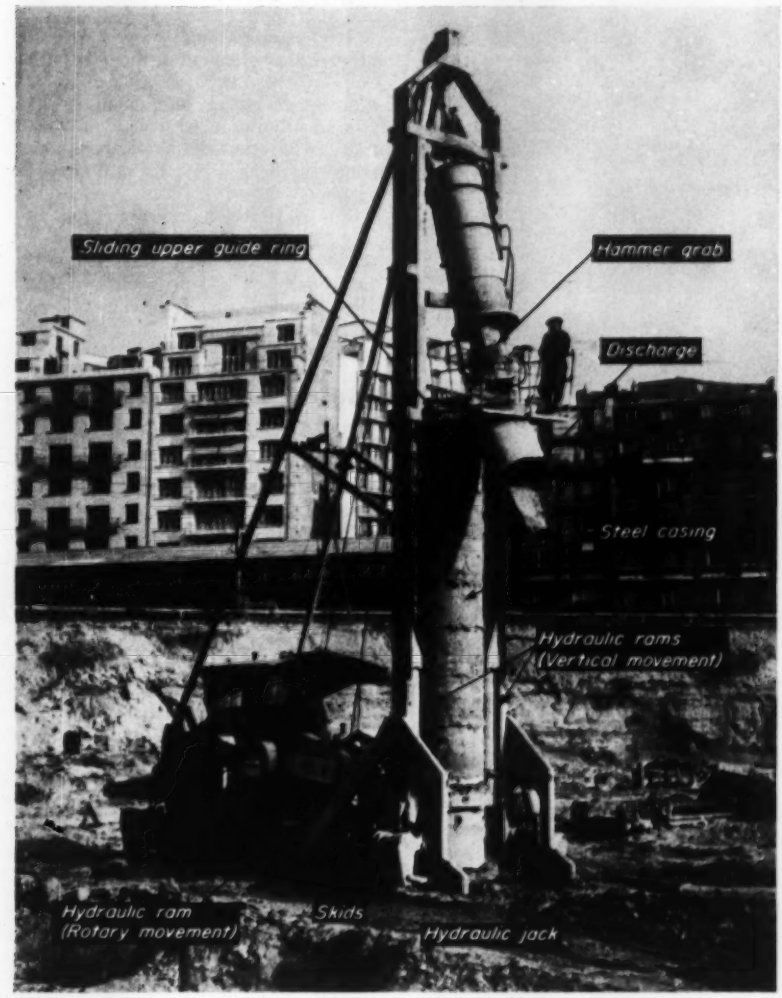

LOCOMOTION at the job site is by hydraulic ram action on skid-mounted rails and rollers but for highway travel the machine is mounted on wheels and pulled by truck.

Time-Saving Hydraulic Rig Digs Caissons

Foundation contractors will find several answers to their caisson-drilling problems in a rugged machine originated in France 20 years ago, and now available in the U.S. It is the Benoto caisson-boring machine, Model EDF-55, capable of sinking shafts up to 40 in. dia and 350 ft deep, according to the manufacturer.

The self-contained, hydraulically operated unit is powered with a 120 hp diesel engine. It is self-propelled on the job, from one hole to the next, and handles all accessory equipment used in sinking steel shell casings, ready for filling with concrete.

Digging operations are performed with a special "hammer-grab," which is an improved version of the well known grab bucket. The casings are made up of 20 ft sections of rigid 20 in. to 40 in. dia steel shells, provided with accurately machined rings for quick assembly. The lower ring is machined with appropriate teeth as a cutting edge.

The steel shells are forced into the ground under the simultaneous operation of two different motions. One is a constant semi-rotary motion provided by two hydraulic rams and a clamp collar. The other is a powerful thrust delivered by two hydraulic rams. This thrust is downward when sinking

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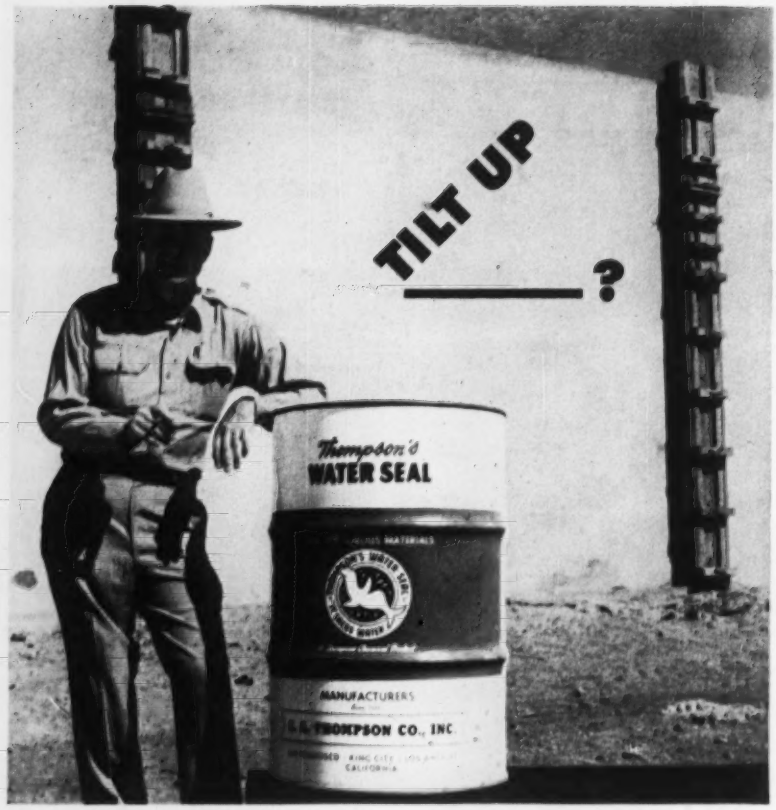


here's the West's Answer to your Concrete Questions!

* **What parting compound delivers smooth concrete without leaving stains or residue that interfere with painting?**
"Thompson's Water Seal eliminated the problem of stains in our tilt-up concrete walls. Now panels are easily removed from the surface slab and painting proceeds speedily."
ASSOCIATED CONSTRUCTION AND ENGINEERING COMPANY OF CALIFORNIA, San Francisco, Calif.

* **Is there one curing, separating and form-sealing method that easily produces hard, dust-free surfaces?**
"Of all the chemicals we tested in our tilt-up work, Thompson's Water Seal proved the cheapest insurance against costly grief and painting troubles."
BAYCITIES CONSTRUCTION CO., Oakland, Calif.

* **Is it possible to prevent all moisture damage in concrete under pressure or capillary action, regardless of weather?**
"As waterproofing specialists in heavy construction work, we use Thompson's Water Seal on all concrete moisture problems with constant success and at a great saving."
STANLEY H. KOLLER CONSTRUCTION, Crockett, Calif.

THOMPSON'S (deep penetrating) WATER SEAL is now Nationally distributed by
THE PITTSBURGH PLATE GLASS COMPANY
For complete specifications, write for new booklet 7-A-4

Thompson's
MANUFACTURERS OF FINE PROTECTIVE CHEMICALS SINCE 1929

E. A. THOMPSON CO., INC. • MERCHANDISE MART • SAN FRANCISCO 3, CALIF.
San Francisco • Los Angeles • San Diego • Portland • Seattle
Dallas • Houston • St. Louis • Denver • St. Paul • Philadelphia

the casing and upward when extracting the steel shell as the concrete is being placed.

The combination of these two motions—the vertical and the semi-rotary one—greatly minimizes the outer friction between the steel shell and the ground around it, as well as the inner friction between the shell and the wet concrete being placed to form the caisson.

For over-the-highway travel the superstructure is folded back over the operating machinery, pneumatic tires are added and the rig pulled by truck.

In moving the giant rig under its own power at the construction site, it is first picked up by hydraulic jacks and shoes at the four corners of the machine. Two skids extending under the full length of the machine are hydraulically moved a maximum of 5 ft forward. The machine is then lowered onto the skids and moved forward 5 ft maximum on a system of rollers and rails, propelled by two double-acting individually controlled hydraulic rams. Its regular crew includes two operators and one or two helpers.

During a recent demonstration in Chicago, the machine dug a 40 in. dia hole through 71 ft of overburden and 3 ft into limestone in five hours. This also included installation of the steel shell ready for concreting. The same machine is scheduled to excavate for the caissons of a 40 story apartment building under construction on Wacker Drive in Chicago.

Numerous foundation works have been done with this machine in Europe, Africa, Asia, Australia and South America, with considerable saving in time, labor and cost, according to the manufacturer. BENOTO, INC., 224 S. MICHIGAN AVE., CHICAGO, ILL.

Autocar Develops Dumper With Capacity of 25 Tons

A new off-highway rear dump truck, equipped with a planetary gear drive rear axle and changes in engineering features, has been developed by Autocar.

The manufacturer says the machine, rated at 25 ton total capacity, is the second of a line of planetary gear-equipped trucks to be introduced in the last two months. The new truck, the AP-25, is available with either a 335 or a 375 hp turbo-diesel engine. The first model, the AP-15, was designed for rated payloads of 15 tons. A third and larger model is planned for spring. THE AUTOCAR DIV. OF THE WHITE MOTOR CO., EXTON, PA.

(*New Products continued on page 71*)

Portable Gantry Has Height And Wheel Adjustment

The wheel-mounted "Magic-Pole Universal Gantry" has a variable wheel tread for passage through narrow isles and doors and is adjustable in height to meet any normal demand. The lightweight gantry consists of an aluminum I-beam with supports on a common axis, so that it can swing freely into a plumb position, and four wheel-mounted telescoping legs, which permit height adjustments. The legs and their braces can be folded against the I-beam for compact storage or hauling.

The trolley is free to travel the length of the I-beam without hindrance. The gantry models are available in heights up to 17 ft, in spans up to 15 ft and up to 2 tons in capacity. B. E. Wallace Products Co., Exton 24, Pa.

New Cork Tile Won't Swell

A cork floor tile is being produced with a plastic finish to prevent moisture penetration and the resulting swelling of the cork. The protective coating is applied to both sides of the tile and seals the walking surface and underneath against dampness.

The tile is available in standard gages. Robbins Floor Products, Inc., Tuscumbie, Ala.

Portable Blueprint Rack

Blueprints are hung vertically from sticks that pull out or insert into identified slots of wall units in the E. Z. Way Blueprint Rack.

The wall units are made of extruded aluminum and hold the sticks in a cantilevered position. Units may be mounted side by side in multiple units to provide a flexible filing system. Blueprint Rack Co., 10033 Sierra Ave., Fontana, Calif.

Schramm Pneumapower is just right for air tools used by contractors, municipalities, utilities, highway departments. Use it to power backfill tampers, chain saws, paving breakers, riveting guns, rock drills, trench and clay diggers, sheeting drivers.

SCHRAMM ASKS COMPRESSORS USERS:

Why use more fuel and get less air power?

Schramm Pneumapower Model 125 piston type compressor uses 15% less fuel than other highly publicized air compressors. Yet it delivers 15% more power—produces 125 cfm of compressed air to operate more pneumatic tools, or the same tools at higher efficiency.

Reason is that compressed air at *higher* temperatures can do more work. And Pneumapower's built-in temperature control holds air constantly at maximum 275°F. For water-cooled, piston type, Schramm Air Compressors can operate safely at temperatures that would cause serious trouble in oil-cooled compressors. Consequently, Schramm Pneumapower Compressors produce far more power.

Schramm Pneumapower is the handiest, most economical air compressor you've ever seen. It's the shortest, narrowest, lowest 125 cfm gasoline engine-driven unit made—and costs the least to buy and maintain.

We'll be glad to send you full details of Schramm Pneumapower Compressors. Write for, "Let's Design a Perfect Air Compressor." No obligation, of course.

Wheel mounted or skidded, Pneumapower is compact, light in weight, easy to handle. Unlike power take-off assemblies, Pneumapower can be placed in any position on truck; it has no belts, gears or other transmission.

Schramm Pneumapower furnishes full rated air at tool—enough to operate a three gang tamper and another tamper.

Schramm, Inc.
MANUFACTURERS OF AIR COMPRESSORS
604 North Garfield Ave. • West Chester, Pa.

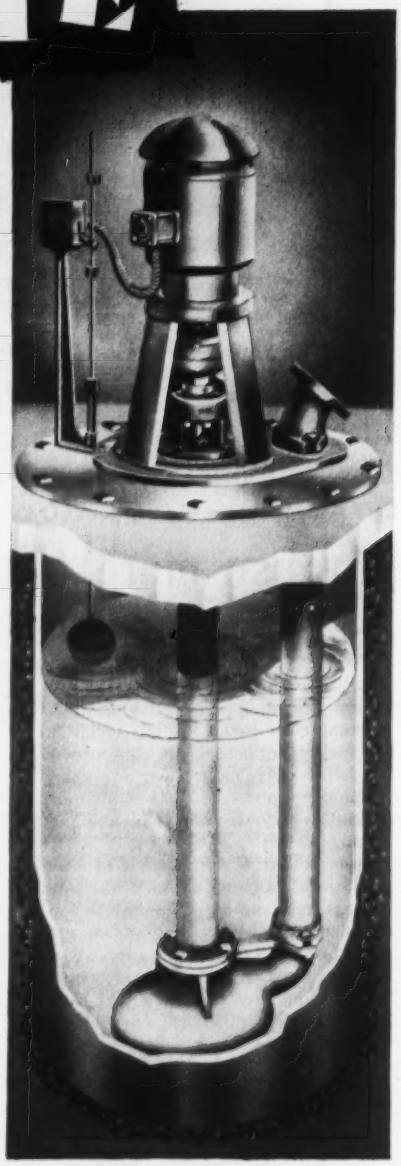
Pump Liquid WASTE with the weil Heavy duty Sewage Ejector

The Weil screenless sewage ejector with the NON-CLOG impeller effectively handles large diameter solids, rags and stringy material of various lengths which are washed into the sewage pit.

RUGGEDLY BUILT: This factory assembled unit has an ample reserve of strength to meet the most severe conditions and furnish years of trouble free operation.

SIMPLIFIED PIPING: Only one piping connection required. An economical installation.

The **NON-CLOG** Impeller (illustrated below) built into the WEIL Screenless Sewage Pump supplies the ideal method of pumping sewage and unscreened liquids containing solids.



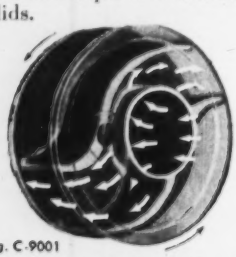


Fig. C-9001

Successfully handles the tough jobs where other pumps fail.

Send for Bulletin C-900 E. Weil Representatives and Weil Engineers are available to help solve your waste pumping problems.

See Catalog in 1957 Sweet's and 1957 Domestic Eng. Cat. Dir.

weil PUMP CO.

1528 No. Fremont St. Chicago 22, Illinois

. . . Publications

Air blender—A new heating and ventilating system for schoolrooms is described in two Westinghouse booklets. Photos and text explain how the air blender system works from a central supply source and how individual room control of heating, cooling and ventilation is provided. BOOKLETS B-5195 AND B-5195-A, WESTINGHOUSE STURTEVANT DIV., DEPT. T-304, 200 REACHVILLE ST., HYDE PARK, BOSTON 36, MASS.

Pneumatic-placed concrete—An 8 page illustrated bulletin describes the features and operation of the True Gun-All machine, which uses mechanical means for controlling water content for uniform quality. TRUE GUN-ALL EQUIPMENT CORP., P. O. BOX 2526, TULSA, OKLA.

Pumps—A folder covers operating characteristics and applications for the lightweight Porta-Pump line, describing the pumps, having complete specifications and an easy-to-read performance chart. BARNES MFG. CO., MANSFIELD, OHIO.

Polyurethane foam—The uses of "Nafil" foamed resin in insulation, acoustical treatment, cushioning and other applications is explained in a 6 page folder. Physical characteristics and economics of the polymer also are discussed. NAFIL BULLETIN, CHASE CHEMICAL CORP., 3527 SMALLMAN ST., PITTSBURGH 1, PA.

Industrial lighting—The new edition of the RLM Standard Specifications for Industrial Lighting Units contains revisions in specifications for both incandescent and fluorescent units. Also included are revised light-distribution curves for direct and semi-direct fluorescent units. RLM STANDARDS INSTITUTE, 326 W. MADISON ST., CHICAGO 6, ILL.

Steel grating—"Ironwalk" steel grating in riveted, welded, and mechanical-lock types is described in an 8 page pamphlet. Selection tables, safe loads, stair tread dimensions, applications and information on fabricating services also are included. J. T. RYERSON & SON, INC., BOX 3817, LOS ANGELES 54, CALIF.

Plastic sheet—A manual dealing with the uses of Micarta, a laminated plastic sheet, is available from the U. S. Plywood Corp. The manual is divided into six sections covering general information, technical data, applications, specifications and pattern charts. U. S. PLYWOOD CORP., 55 W. 44TH ST., NEW YORK 36, N. Y.

How torque converters *assure* higher dividends from your major equipment investments

Twin Disc Torque Converters, dependably and efficiently transmitting power to your heavy-duty machinery, *assure you a higher return* on your equipment investment, through *more work done in less* time . . . with a *minimum of maintenance and costly downtime.*

Here are six *profitable, proved* reasons why Twin Disc Torque Converters help you to earn *more* from your major equipment investments . . . such as the International TD-24 Tractor pictured above.

1. Three-stage design provides the highest engine output torque multiplication available—eliminating harmful, costly engine lugging and stalling.

2. Engines work up in the maximum efficiency range all the time, delivering *constant,* high-horsepower output . . . doing *more work* than units equipped with mechanical drive.

3. Power is matched to load demands automatically with gear shifting minimized or eliminated—where mechanical transmissions usually must *stay* in the starting gear ratio, even after starting load resistance is reduced . . . operator efficiency is boosted.

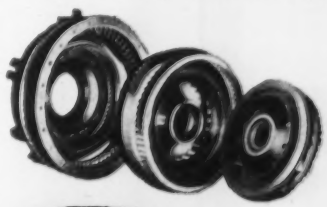
4. Heavy load pick-up is smooth, even, without clutch slippage . . . better flotation is obtained.

5. Overloads, shock loads and vibrations are cushioned out, through *fluid* connection . . . providing longer tractor life with less maintenance.

6. Infinite variety of ratios is available to work with, permitting smooth, accurate control of loads.

Be sure to specify a torque converter in *your* next International TD-24! And investigate the advantages of Twin Disc Torque Converters—both single-stage and three-stage—for most other heavy-duty applications from 30 to 1000 hp.

This International TD-24 is pushing a scraper and pulling a ripper simultaneously. International has standardized on Twin Disc components for the torque converter version of the TD-24.



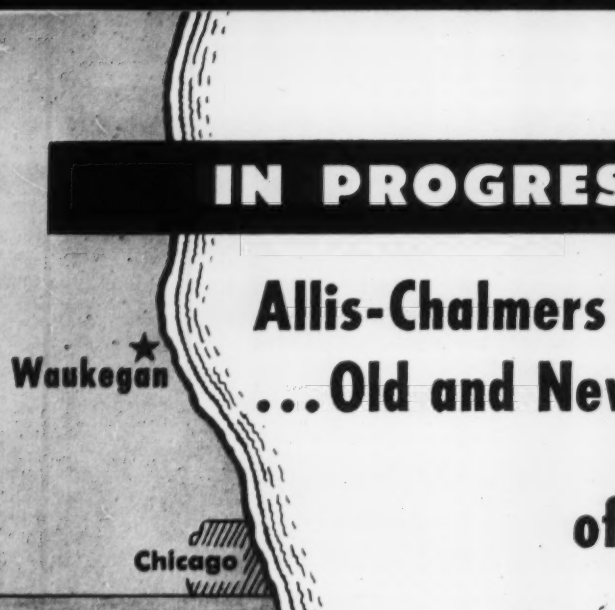
TWIN DISC

TWIN DISC

Torque Converters

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division), Rockford, Illinois

IN PROGRESSIVE WAUKEGAN



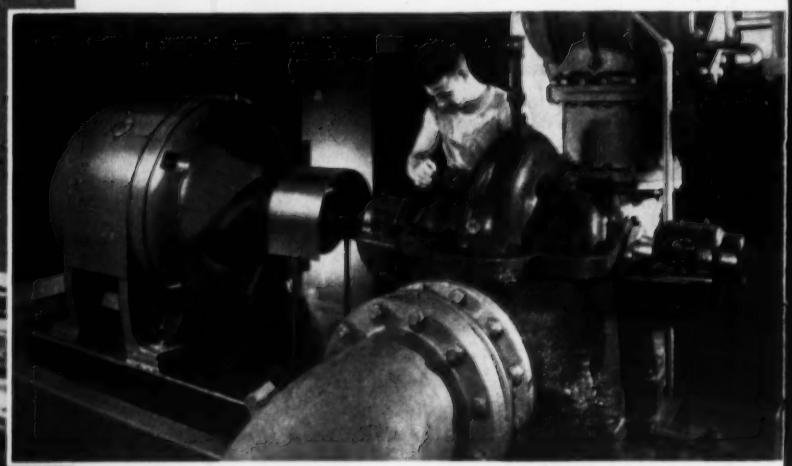
Allis-Chalmers Water Works Equipment ...Old and New...Helps Provide Plenty of WATER

On the shore of Lake Michigan, just north of Chicago, is Waukegan, Illinois, a busy industrial center and home of more than 70 thriving concerns manufacturing over 400 varied products.

Water for the more than 60,000 townspeople is piped from the depths of Lake Michigan into the lake-front water plant for treatment. An average of 6.7 million gallons of water flows daily through 100 miles of mains. Capacity of the filter plant is 10 million gallons daily.

Allis-Chalmers equipment, including pumps, motors, control, switchgear and motor-generator sets, has been giving outstanding service since 1929. Recently, new pump-motor-control units were installed to increase the plant capacity.

When YOUR CITY plans expansion or modernization do as other progressive communities are doing. Call your nearby Allis-Chalmers office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

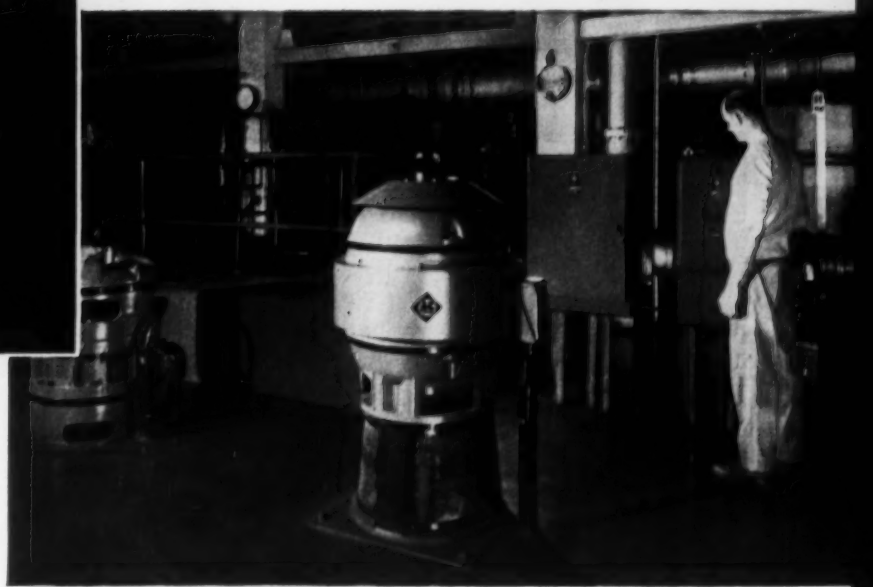


Newly installed Allis-Chalmers horizontal high lift, 7½-mgd, 220-ft head pump, driven by Allis-Chalmers 350-hp, 1170-rpm motor, with Allis-Chalmers control panel.

ALLIS-

Overall view of Waukegan Water Works pump floor, showing Allis-Chalmers pumps, motors, control, and switchgear handling high lift, low lift and wash water service.

New Allis-Chalmers vertical drip-proof motor (right), drives the Allis-Chalmers low lift pump shown in the photo above. Motor is rated 100 hp, 1170 rpm. Pump is 12 by 12 vertical type, delivering 7½ mgd against a 55-ft head. The control also is manufactured by Allis-Chalmers.



CHALMERS

A-C ALLIS-CHALMERS

A-5215

Ancient Building Rebuilt to House Greek

Davis P. Barnett
Rome, Italy

An ancient building, first erected about 159 B. C., has been reconstructed in Athens, Greece, to house the discoveries uncovered in archeological excavations at the Agora. The building, known as the Stoa of Attalos—a gift of Attalosoe II, King of the Pergamon—was originally a market place. It was destroyed by fire in 267 A.D., during an invasion by barbarian armies.

It was chosen for reconstruction because its design permitted its use as a museum and provided facilities for scholars. Furthermore, there were sufficient physical remains to assure accurate reconstruction.

The building stands on the east side of the Agora, or market place, of ancient Athens. The main body of the building is two stories high, 382 ft long and 49 ft wide. The first floor originally provided a deep colonnade and 21 shops. Now, it houses a museum and a partial restoration of four shops. The second floor, which duplicates the basic ground-floor plan, now shelters the study collections for students.

• **Subsurface drainage**—Preliminary investigations showed that water draining down from the Acropolis had softened the clay subsoil beneath the existing foundation walls to depths between 0.8 to 2 in. so an extensive drainage system and underpinning were installed to assure permanent stability of the new structure.

The drainage system, which is 27 ft below grade at its deepest point, drains into the sunken roadway of the Athens electric railway, which passes on the north side of the Stoa. Cost of the 1,026 ft of drain which required 263 cu yd of concrete, was $12.53 per lin ft.

Concreting of the underpinning began as soon as the drainage system was complete. The north wall of the building, the widest section of the foundation needing such support, was 12 ft thick. Concrete was placed in 1 yd square sections, and the pour was to within 4 in. of the bottom of the foundations. These sections were then dry packed. The total pour—1,450 lin ft—amounted to 463 cu yd of concrete at a cost of $18.51 cu yd.

• **Remains salvaged**—In the reconstruction, whatever remained of the original structure was to be incorporated in the new building.

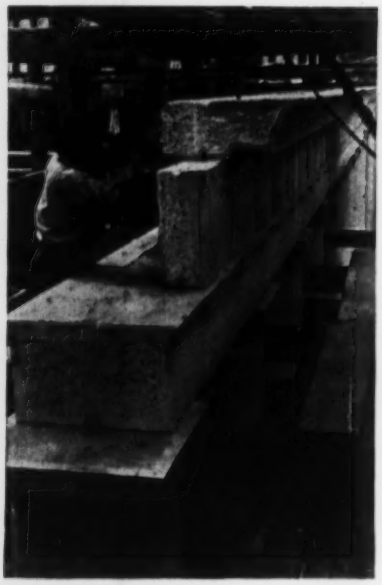
Preservation work had been done in the last century on the existing walls above street level. These walls were now further strengthened with limestone. The walls of the colonnade and the northeast corner could still carry their own weight, but no superimposed loads were applied, since it was found they had been severely calcified by the fire that destroyed the initial structure.

Originally, the first floor and roof were carried on wood beams. The large solid timber sizes required to reproduce them were not available for the reconstruction. Reinforced concrete was used instead. This increased the load the foundation was to carry.

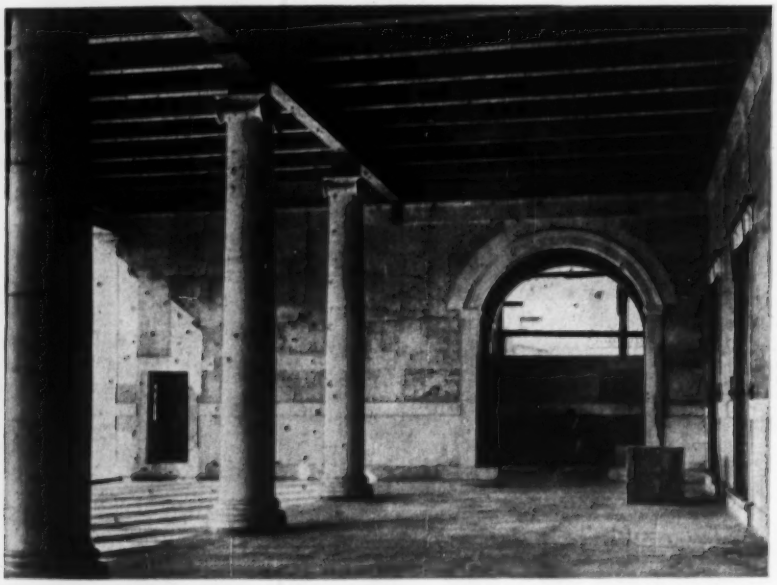
Loading tests on subgrade—a compacted clay—indicated it could safely bear a weight of 3 tons per sq ft. This bearing capacity permitted use of spread footings and concrete piers for the first-story columns and the reinforced concrete first-floor slab.

• **Column loading**—Design calculations showed that highly concentrated loads, about 90 tons per column, would occur along the center Ionic column line on the ground floor. Horizontally grained Pentellic marble with a compressive strength of 12,000 psi was used for this line of columns.

The Doric column line supporting the facade bore a somewhat lighter load.



ENTABLATURE provides shelf for supporting the second-floor slab.



MARBLE COLUMNS supported reinforced concrete beams for the second floor in lieu of original wood beams, which were larger than now available.

Museum

Vertically grained Pentellic marble with a compressive strength of 7,400 psi was used for these columns.

The shell limestone mined from the quarries at Piraeus, which composed the interior walls, tested at 134 psi in compression. This indicated that all live and dead loads could be carried by the stone and marble structure.

Questions arose concerning the relative deformations of stone, marble and concrete under expansion and contraction forces throughout the building. There was little or no prior experience with marble supporting concrete slab construction. The differential movements were minimized by dividing the second floor and roof into nine expansion and contraction panels, the same design and sequence of concreting being used on both levels.

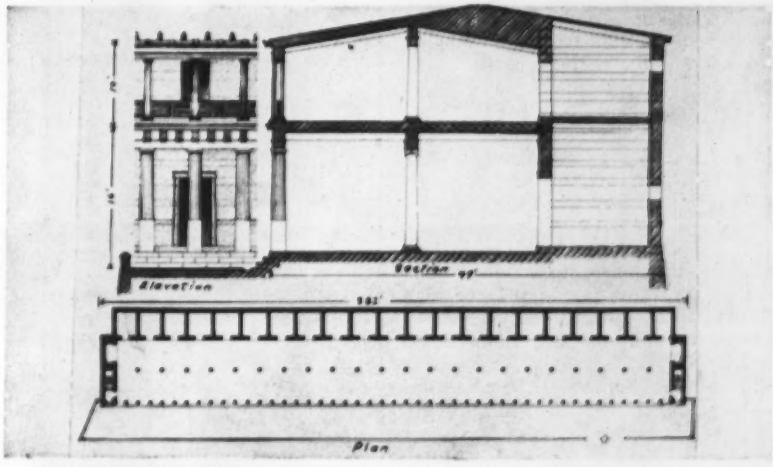
A system of cantilevered concrete members was used to set up a proper reaction along the center line of the colonnades and to reduce stresses on the columns. To permit free movement of each member, alloy-steel rollers were placed at some columns. Under other conditions, the main supporting beams cantilevered out to within 2 in. of each other, whereas maximum expansion and contraction of the concrete was limited to 0.12 in.

• **Cost figures**—Some 1,800 blocks of marble and 5,400 blocks of stone were set as the main supporting units of the building. The total cost of the marble came to $466,500 and the stone to $248,160, all labor included. Exclusive of the plywood and 90 tons of reinforcing steel imported from the U. S., the 5,000 cu yd of concrete were placed at a cost of $25.07 per cu yd. Laminated wood beams to simulate the ancient timber construction, terrazzo floors, a heating system and other finishing details brought the total cost of reconstruction to $1,500,000.

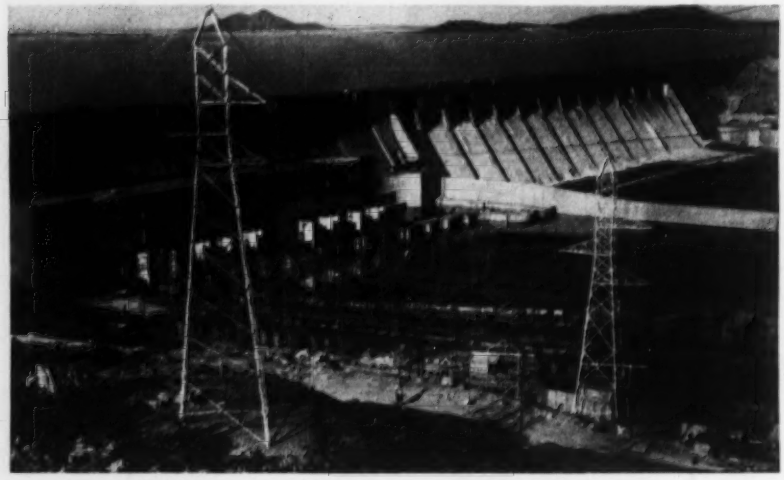
The project was financed by the Rockefeller Foundation, the Rockefeller Family and many individual donors. The project was under the direction of John L. Caskey, Director of the American School of Classical Studies. M. A. Tavarex was the project engineer. W. Stuart Thompson was the architect of the reconstruction and John Travlos, the archaeological architect. Charles Mayer of New York and George Biris of Athens were consulting engineers for the reconstruction.

AT THE START of reconstruction what was left of the original Stoa of Attalos was exposed. Excavations in the ancient market place are in the foreground.

RECONSTRUCTED STOA provides space for displaying archaeological finds at the Agora. In the rear areas will be some reproductions of ancient shops.



COMPLETED BUILDING reproduces the original exterior. The exposed part of the foundation is faced with limestone, while the rest of the facade is marble.



Powerhouse and spillway section of 16,000 ft long Hiracud Dam . . .

India's First "Modern" Dam

India's Hiracud Dam, recently commissioned into service by Prime Minister Nehru, is something more than the first great multipurpose structure in the country's barren southern peninsular plateau. It is also the first operating symbol of change from hand to mechanized construction in Indian dam-building (ENR 1951, Mar. 1, p. 32, June 7, p. 35).

The $150 million project in the State of Orissa was shaped by $5 million worth of U. S. equipment—shovels, tractors, graders, scrapers and wagons. But highly mechanized as it was by Indian standards, it was still far from being completely mechanized. At one point 30,000 laborers were employed at the site.

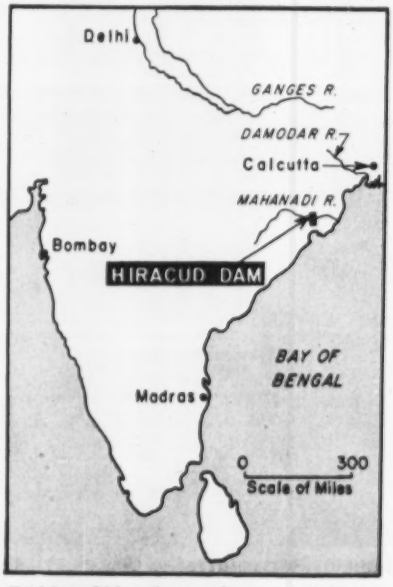
• **Five-section dam**—Hiracud Dam, controlling the Mahanadi River, is an earthfill, masonry and concrete structure about 16,000 ft long. Built in five sections, the portions of the main dam are: (1) masonry power dam (gravity type)—948 ft; (2) right concrete spillway with masonry transitions—1,180 ft; (3) earth dam of zoned fill type—7,540 ft; (4) left concrete spillway with masonry transitions—1,640 ft, and (5) earth dam of zoned fill type—4,400 ft. Average height is 150 ft; maximum height in masonry portion is 200 ft and in the earth portion 195 ft.

Some 17 miles of earth saddle dikes flanking Hiracud Dam will help contain a 6.6 million acre-ft reservoir. A spillway section with 64 sluices with vertical slide gates will help control the lake. These bottom sluices will be used to pass normal floods and thus keep the reservoir at optimum level for power generation. Large floods will, of course, go over the spillway.

Concrete and masonry used in the dam and powerhouse total 39 million cu yd. The non-overflow portion of the dam, including the power dam and training walls, is of masonry—granite stone. About 5 ft of concrete is laid in foundations under the masonry. All openings in the structure are reinforced concrete. Coping is also concrete. The overflow portion is of plain concrete, and bucket, crest, piers and openings are in reinforced concrete.

Seven penstocks in the power dam run 23 to 25 ft in diameter—the largest in the Far East to date. Four generating units have been installed in the powerhouse: two of 27,000 kw each and two of 37,500 kw each. Provision has been made for adding three more 37,500 kw units in the second construction phase.

Connecting the main dam to a subsidiary dam 14 miles downstream is an 18,000 cfs power canal. The subsidiary dam is 85 ft high and 22,800 ft long, with about 1,000 ft in concrete.



DAM is 200 miles southwest of Calcutta.

• **Irrigation aspect**—The inaugural ceremony pressed into service the first phase of the Hiracud project. Generation of 24,000 kw of power was started at the downstream subsidiary dam (ultimate capability is to be 96,000 kw). And irrigation water for 100,000 acres of land was sent on its way.

The irrigation feature of the multipurpose project is an important one. A canal system ultimately will irrigate annually an area of 700,000 acres. The main canals in the system are the Bagarh, 55 miles long and designed to carry at the head a full supply discharge of 4,802 cfs; Sason canal with a capacity of 630 cfs and stretching 14 miles; and Sambalpur, 12 miles long with a capacity of 120 cfs.

When the Hiracud scheme swings into its full potential, it should set Orissa on its way to becoming one of India's richest states. It will make possible cultivation of an additional 2.4 million acres of land and supply 325,500 kw of power. To this is added the wealth of the state's untapped forest and mineral resources.

Britain's $42 Million Road Job Started at Birmingham

Britain's Minister of Transport has given permission to start work on the first part of Birmingham's inner ring road which is expected to solve the city's traffic problems.

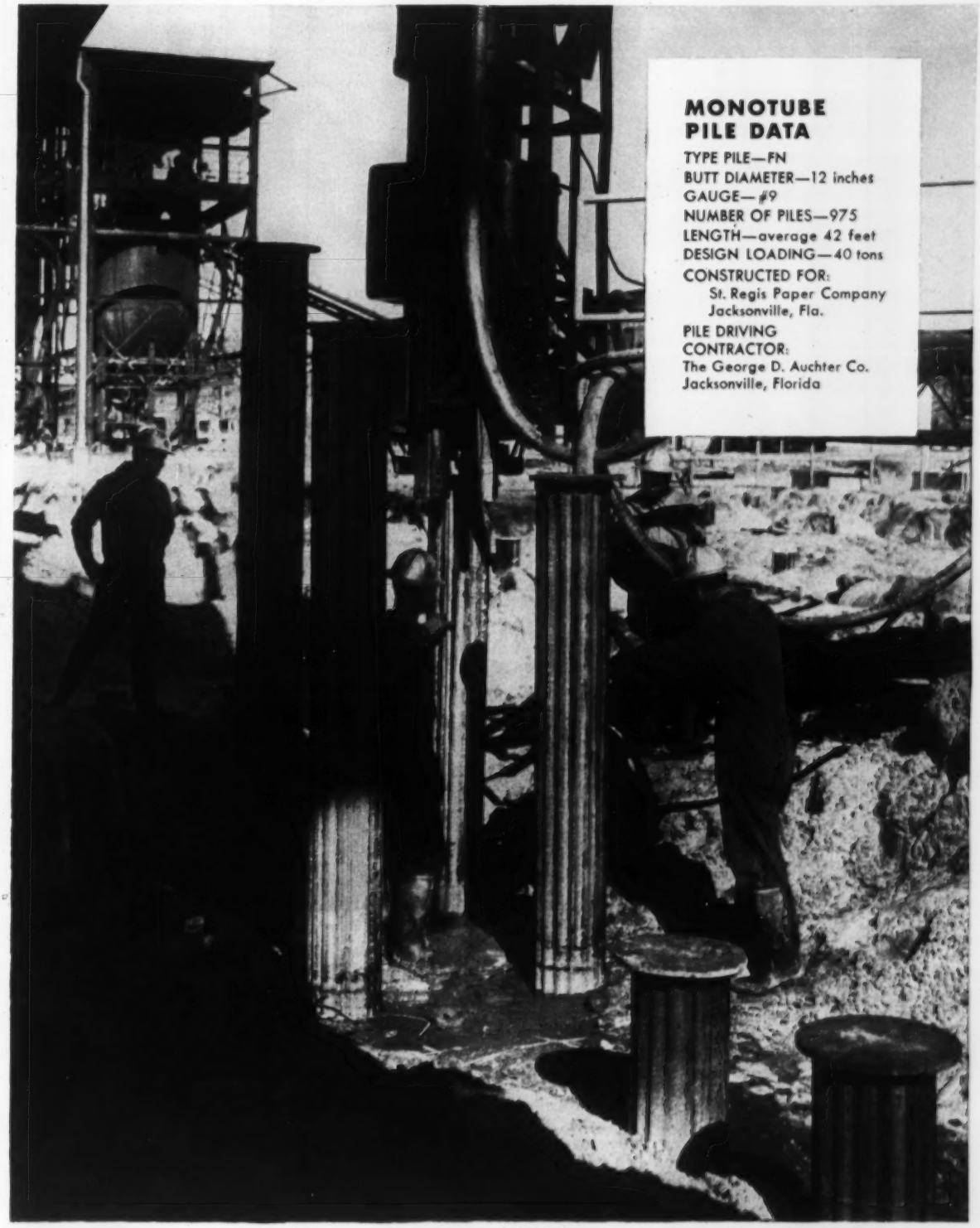
Work will start within the next few weeks and this first part is expected to cost over $2.6 million, of which the government will pay about $1.9 million.

It is the city's biggest post-war road construction plan which has been under consideration since before the war. The total cost will be about $42 million.

Ontario Spends $1.8 Million to Improve Harbor

More than $1.8 million will be spent by the Department of Public Works in the City of Hamilton, this year, and of this $1.7 million will be used for harbor improvements.

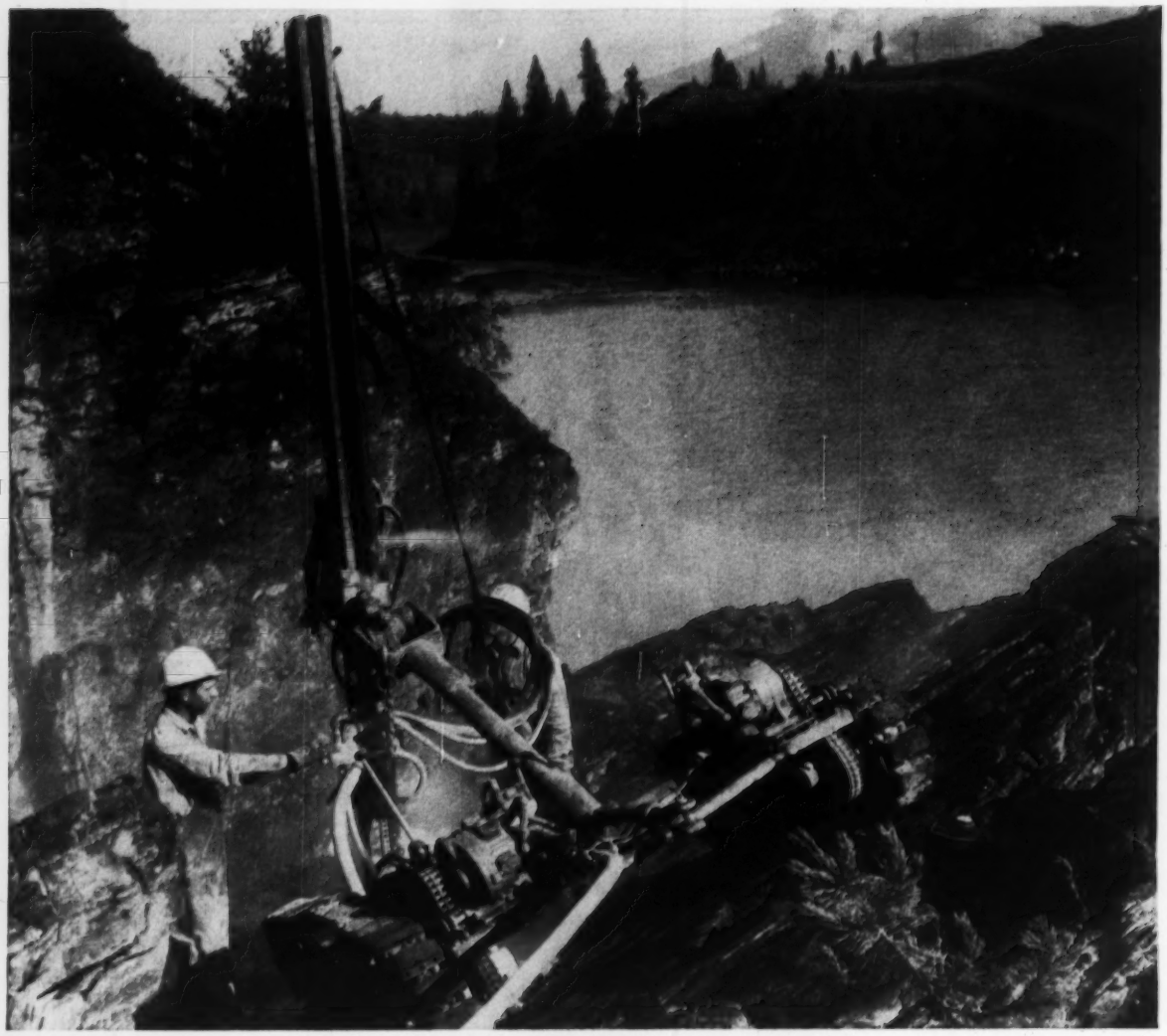
The harbor work will include extensions to existing wharves and terminals, and dredging of the harbor as well as the approaches to the terminals.



ASSURANCE + ECONOMY with Monotube piles. St. Regis Paper is typical of the many industrial companies relying upon Monotube steel piles for permanent, dependable foundation support. Tapered, fluted Monotube piles are available in lengths, diameters and gauges to meet every requirement. Write The Union Metal Manufacturing Co., Canton 5, Ohio for complete information.

UNION METAL

Monotube Foundation Piles



Gardner-Denver "Air Trac" with 4½" drill on dam project.

Gardner-Denver "Air Trac"® one of the busiest drills in the business

Gardner-Denver "Air Trac" is a self-propelled drilling rig—powered by two high-torque, five-cylinder radial motors. It puts holes anywhere you want them—on steep hillsides, in rocky terrain, on level ground. Self-stabilizing column arm supports chain feed drilling mast. Available with two drill sizes: DH123—4½", HD99—4".

TO ROCK WORK CONTRACTORS: Let us show you why Gardner-Denver "Air Tracs" are preferred by most contractors for heavy-duty drilling. Write for illustrated booklet.

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

Behind The Ohio method—

A strong team headed by veteran highway engineer Everett S. Preston

THE TEAM E. S. Preston (center) is flanked (from l to r) by B. T. Wade, E. M. Raley, R. H. Sheik and L. O. Herd.

Ohio's Preston Takes a Look Ahead

A number of other state highway departments have done more with electronic computers than has Ohio, but Ohio stands in the vanguard of the effort to fit computers—and other modern tools—to the total highway design picture (see page 37).

The man chiefly responsible for Ohio's eminence is Everett S. Preston. Now functioning out of the specially created title Engineer of Aerial Engineering and Electronic Computing, Preston was formerly Chief of the Bureau of Location & Design.

To his work in developing the Ohio method of mechanized highway design, Preston brought 25 years of experience in highways, with a contractor, a consultant and as surveyor, project engineer, designer and planner during 22 years with the state highway department. It is not without significance that Preston is the highest placed state highway official in the country to devote his efforts exclusively to fitting modern tools, especially electronic computers, into the scheme of things.

Many other states appear to be relying excessively on non-highway personnel, the mathematician, statistician and computer programmer. Such personnel are, of course, vital, but most persons who are familiar with this new area believe it requires a thoroughly experienced highway engineer to see the broad picture with all its pitfalls and ramifications. And particularly an engineer like Preston, who is forward thinking, quick to adopt new methods and a driver.

Like most major achievements in this day, Ohio's was a team effort, Robert H. Sheik, Engineer of Aerial Surveying, and his deputy Lloyd O. Herd, Engineer of Photogrammetry, are long experienced in their fields and were instrumental in making their specialties fit smoothly into the overall scheme. Earl M. Raley, Engineer of Data Processing, did the major work in bridging the gap between highway designer and computer in regard to the various computer programs. Under him, Bailey T. Wade, Supervisor of Computing Laboratory, and the only non-highway man in the top echelon, translated the programs into computer language, adapted computer outputs to a form best used by highway designers and field crews.

And not to be overlooked are the men who provided the money and encouragement, former Director of the Department of Highways, Samuel O. Linzell, and his recent successor Charles M. Noble.

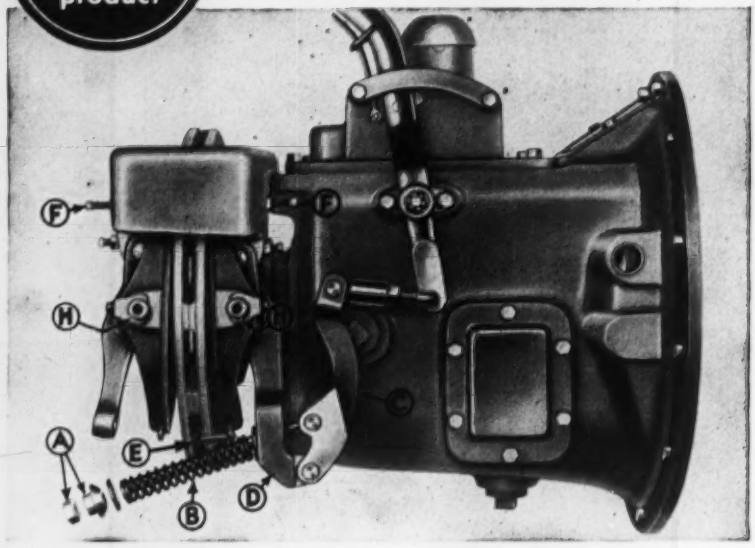
With the Ohio method now in operation, Preston and his team face a difficult proving out period, in licking the inevitable bugs that will crop up and in making the method understood and readily accepted by all the design offices. Nonetheless, they are still thinking ahead to improve the method and to develop additional applications for electronic computers.

Preston visualizes the ultimate Ohio method employing a large size electronic computer (costing $1 million or more as compared to present selling price of $250,000 for the IBM 650) which with its larger memory can handle all of the programs in one pass, thus eliminating various human errors. For other lengthy or complicated applications, this computer would be combined with a group of smaller computers with input and output transmitted on magnetic tape which is many times faster than punch cards. Representations of cross sections would be developed on a large-screen cathode ray tube that is in line with the large computer. Indeed, Preston hardly permits himself to think of one other possibility in this connection—if simple cross sections can be represented on screens, why not most of the tedious drawings required for contract plans?

(Continued on page 82)

an ACCO product

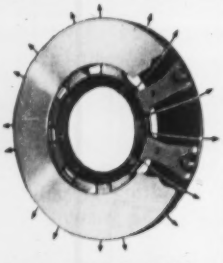
It Pays to Specify TRU-STOP Brakes



How TRU-STOP Brakes save more money than they cost!

TRU-STOP performance in just one emergency may more than offset any additional first cost. But their true economy shows up when it comes time to adjust or reline.

TRU-STOP brakes are adjusted and relined *without dropping the drive shaft.* Both are quickly and easily done with only a few simple tools. Down time is reduced to a minimum.



Longer Lining Life

• The terrific heat generated in braking cuts lining life. TRU-STOPS quickly dissipate this heat. Most of the disc is exposed to the air even during braking. And a cooling jet of air circulates through the disc, prolongs lining life.

See how easily adjustment is made
(illustration above)

1 Tighten nut A so that spring B exerts enough pressure to bring lever C to stop solidly against lever arm D.
2 Insert 1/32" shim between front shoe lining and disc and adjust pull-rod to maintain this clearance, first being sure to have hand-lever in full release position.
3 Further tighten nut A so that rear shoe lining is firm against disc but so that shim in front can still be removed. Remove shim.
4 See that tension spring E is in place, then adjust screws F so that linings are parallel with disc.

See how easily relining is accomplished

1 Remove nut A.
2 Remove spring E.
3 Apply hand lever so that rear arm can be swung back clear of tie rod and spring.
4 Remove shoe pin locks H, and drop shoe.
5 Replace relined shoes and adjust as per instructions.

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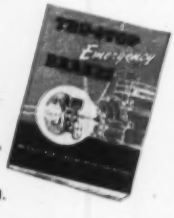

More immediate goals, though, are development of computer programs for traverse closure, ditch and culvert design, and location and design of bridge structures. Preston looks to the upcoming "share the program library" between the states and various private computer users for help here.

The Ohio innovator is realistic in assaying the extent of application of his method. Its use in Ohio should become universal in rough terrain. But the difficulties of urban design, regarding complicated interchanges, utilities lines and other underground structures, tend to lessen the importance of earthwork and therefore the Ohio method. Judging from his experience in directing $224 million of state engineered work placed under contract last year and the potential of the Ohio method, Preston believes that private consultants will continue to play an important role in Ohio highway design.

Careers . . .

Government

Robert W. Davis, Bureau of Reclamation engineering authority on lower Colorado River channalization and other protective works retires as chief, Channel Control Branch of the Regional River Control Division, Region 3.

H. W. Kueffner, city public works director at Durham, N. C., is elected president of the North Carolina Section of the American Public Works Association.

Lt. Col. William K. Shaffer, is named assistant district engineer of the Wilmington (N. C.) District, Corps of Engineers.

Lester M. Goldsmith is named Philadelphia Engineer of the Year by the Pennsylvania Society of Professional Engineers. He is general manager of engineering and construction, The Atlantic Refining Co.

Honors

Granville M. Read, chief engineer of E. I. du Pont de Nemours & Co., is cited by the Delaware Society of Professional Engineers as Delaware's outstanding engineer of the year.

William R. Holway, Tulsa (Okla) consulting engineer who in 1929 surveyed a new water supply for Moscow, Russia, is cited by MIT for "outstanding achievement and contributions to society." The MIT graduate has built water supply systems for Tulsa, Houston and Santiago, Chile, among others. His firm of William R. Holway & Associates is currently designing the proposed $34 million Markham Ferry dam and hydroelectric plant.

NO REBORING—

NO KEYSEATING—

NO MACHINING—

NO WAITING!

TAPER-LOCK SPROCKETS
SINGLE AND DOUBLE STRAND!

NOW Taper-Lock *Double* Strand Sprockets are available—from stock—ready for the shaft without re-machining!

They offer all the advantages of Taper-Lock mounting. Easy on! Easy off! Precision machined at the factory, they come to you with accurate, concentric bores—insuring full contact between hub and shaft. Taper-Lock grips with the firmness of a shrunk-on fit!

There is no flange, no collar, no protruding part. Flush design means *safety*... If the sprocket becomes worn, you replace only the tooth part. The bushing is used again and again. And Taper-Lock bushings are interchangeable in Dodge Taper-Lock Sheaves, Couplings and Conveyor Pulleys!

Taper-Lock Sprockets and Dodge Roller Chain (made to ASA standards) are stocked by Dodge distributors. Single Strand sizes range from No. 40 to No. 160, up to 112 teeth; Double Strand from No. 40-2 to 80-2, up to 102 teeth. Write for Bulletin A-644 containing selection, installation and maintenance data.

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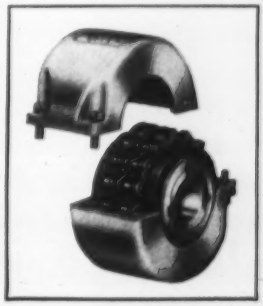
of Mishawaka, Ind.

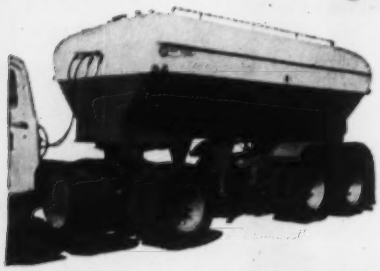
CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new methods. Look for his name under "Power Transmission Machinery" in your classified phone book, or write us.



TAPER-LOCK CHAIN COUPLINGS

Accommodates common minor shaft misalignments. Provides strong, compact coupling. Available with covers, for appearance, safety, dirt protection and lubrication—which increases coupling life.

The modern, effective way to handle cement for rear discharge!



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CEMENT TRAILER

incorporates the Fuller Air Slide Principle

Will cleanly evacuate 100 barrels of cement in 10 minutes. No pounding or vibrating necessary. Air pressure gives complete rate of evacuation control. Low height and perfect load distribution. Fast loading through a minimum of 3 roof hatches. Hopper bottom gravity flow models also available.

Prices and weights quoted on request.

Distributorships available in certain areas

"Custom-Made Material Trailers—for ANY Commodity"

OMAHA STANDARD
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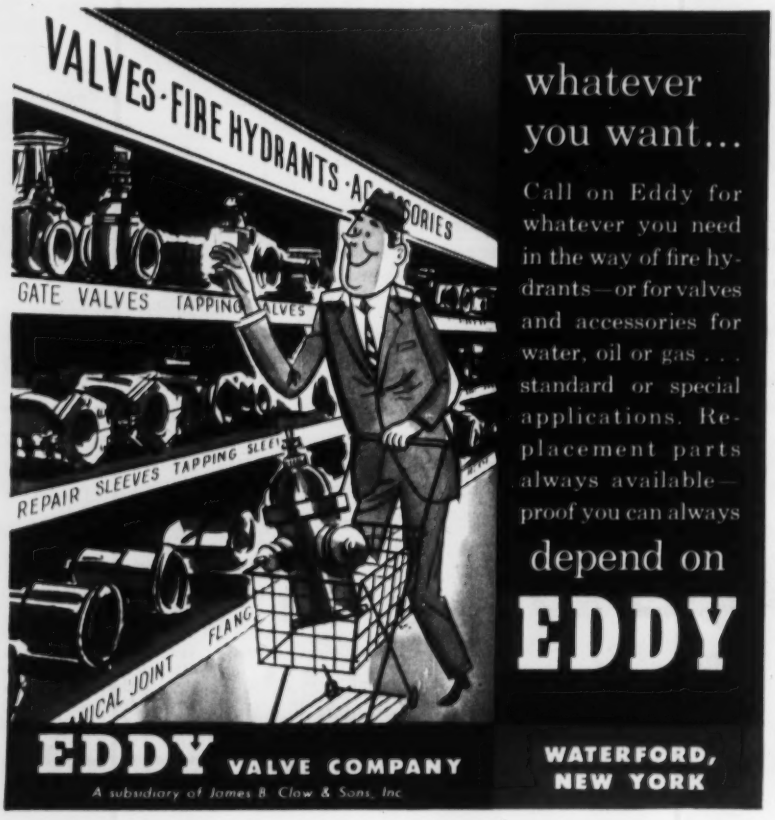
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REPAIR SLEEVES TAPPING SLEEVES
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Call on Eddy for whatever you need in the way of fire hydrants—or for valves and accessories for water, oil or gas . . . standard or special applications. Replacement parts always available—proof you can always
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WATERFORD, NEW YORK

Obituaries

Frederick W. Paulin, 75 civil engineer and founder of Canadian Engineering and Contracting Co., died Jan. 18 in Hamilton, Ont. He also formed F. W. Paulin Contracting Co., and had served as city engineer of Niagara Falls, Ont., as president of the Great Lakes Concrete Pipe Co. of Buffalo, and as the first Canadian president of the American Concrete Pipe Association.

Wells W. Grotte, 54, senior engineer in the Connecticut State Highway Department, died in Warehouse Point, Conn., Feb. 13.

Constantin P. Melioransky, 68, an AW assistant division engineer in the design department of the New York City Board of Water Supply, died Feb. 5. From 1924 to 1938 he served as assistant structural design engineer for the New York Central Railroad System. He joined the water board in 1938, and one of his most recent jobs was working on designs for the Delaware River water project.

Fred W. Fisch, 59, retired deputy superintendent of the New York State Public Works Department, died Jan. 28 at Schenectady, N. Y. A 1918 graduate of Union College, he was the first director of the state's Bureau of Arterial Route Planning.

Knyle R. MacDuff, 60, for 25 years a civil engineer with the Michigan State Highway Department, died Jan. 29 at Greenville, Mich. MacDuff was a graduate of the University of Michigan. Before retiring in 1954, he had been surveyor of preliminary plans on the Mackinac Straits Bridge.

Glenn C. Cook, 52, civil engineer for the American Builders Supply Co. of Louisville for the last 25 years, died in Logansport, Ind. He was a graduate of the University of Kentucky.

A. D. Edmonston, 73, retired California state engineer and one of the chief planners of California's $14 billion water plan, died at San Francisco, Feb. 22. As state engineer, Edmonston directed the original studies leading to the water plan, for which the $1.5 billion Feather River project is the beginning. Before he became state engineer, Edmonston was assistant state engineer under the late Edward Hyatt, working with him in preparing the engineering details for the state's original Central Valley Project. Edmonston was graduated from Stanford University in 1910.

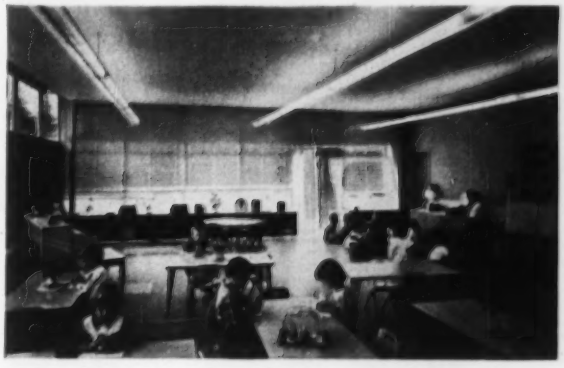
North Street Elementary School was designed by Sherwood, Mills & Smith, Architects, Stamford, Conn. *General Contractor:* A. Barbaresi & Son, Inc., Mt. Vernon, N. Y.; *Structural Engineer:* Seelye, Stevenson, Value & Knecht, New York City.

STEEL JOISTS HELPED LOWER BUILDING COSTS OF ELEMENTARY SCHOOL IN CONNECTICUT

North Street Elementary School in Greenwich, Conn., is a highly attractive example of modern school design. It starts with kindergarten and extends through the sixth grade, with age groups separated into primary and intermediate wings, which extend from a central unit of offices and non-classroom areas. Chief feature of the school's design is the fact that it is scaled to small children's use. The gymnasium has a child-height stage; and ceilings throughout the building are lower than usual.

Construction of the Greenwich school was planned to be both attractive and economical. Exposed interior brick, liberal use of glass and bright colors make it eye-catching, yet construction cost was held to $14.85 per sq ft.

Bethlehem Open-Web Steel Joists were used in the roof structure. The advantages of using Bethlehem Joists were many. They were delivered to the job site tagged and ready for placing with no delays to the construction schedule. They required only field welding to secure them in place, and to provide a rigid, permanent construction, a factor which will help hold future maintenance to a minimum. Pipes and conduits could be run right through the open webs, and installation of recessed lighting fixtures was simplified.



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM OPEN-WEB STEEL JOISTS

BETHLEHEM STEEL

Highway viaduct demonstrates **Three**

# of fir plywood

Fir plywood solved complex form problem on Alaskan Way Viaduct.
The ¾ mile double-decked structure required only 400,000 square feet of plywood.

key advantages concrete forms

1. time and labor savings

On this six-lane Seattle highway viaduct, standardized fir plywood form sections helped complete the job months ahead of schedule. Fir plywood forms were used for beams, girders and road slabs.

2. economy through re-use

About 400,000 square feet of 5/8" fir plywood was required for the 3/4 mile double deck structure. Contractors reported an average of four re-uses. About 25% of the fir plywood forms gave 10 uses.

3. smooth, fin-free concrete

The smooth surfaces obtained with the plywood forms cut finishing to a minimum, the contractor reports. Job Superintendent John Rumsey, Jr. says: "Fir plywood solved a complex form problem for us and speeded work all along the line."

Beam and girder bottom forms were built up inside standard vertical form panels in what contractors called "floating beam bottoms," to handle variable beam and girder depths.

Pattern of plywood forms for girders and cross beams is shown here. Standard panels for shallow cross beams and shallow center beams were not as high as those for girders.

DFPA TESTED QUALITY

ALWAYS SPECIFY BY DFPA GRADE-TRADEMARKS

INTERIOR PLYFORM®—standard concrete form grade made with moisture-resistant glue. Gives multiple (10-12) re-uses.

EXTERIOR PLYFORM® —standard form grade made with waterproof glue. Gives maximum (25 or more) re-uses.

OVERLAID FIR PLYWOOD—special panel with hard, glossy fused resin-fiber surfaces. Waterproof glue. Up to 200 re-uses.

FOR YOUR FILES: Complete application-specification-design portfolio assembly. Write (USA Only) Douglas Fir Plywood Association, Tacoma 2, Washington, Dept. 135.

ALASKAN WAY VIADUCT
LOCATION: Seattle, Washington
CONTRACTORS: Morrison-Knudsen Co., Inc.
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SAVE MONEY ON WET JOBS

pre-drain faster with HIGH-CAPACITY equipment by

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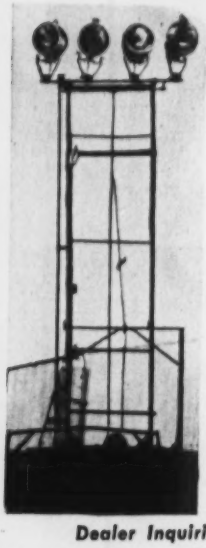
Catalogue on request

TOWER MOUNTED PROPANE FLOODLIGHTS



Skid-mounted, 18-ft. steel pipe frame tower weighs 600 lb.

Light volume adjustable up to 6,000 c.p. per light. Boom elevation adjusted by winch.

Assembly of four lights operates 12 hours at full capacity on 20-lb cylinder of fuel, at fuel cost of 15 cents an hour.

Light instantly with match even in —40° temperature. Safe, totally weatherized.

Also available: 4 to 8-ft. telescopic stands for individual lights.

Dealer Inquiries Invited

WRITE, WIRE, OR PHONE

WM. W. LEE and SON

20 EAST JACKSON BLVD.
CHICAGO 4, ILLINOIS

Additional Spans for Corpus Christi Bridge

Five steel truss spans and 10 plate girder units for Corpus Christi Ship Channel Bridge in Texas will cost $5,542,584. These third and fourth contracts bring the total price up to $8,057,778 or $16.89 per sq ft of deck. Except for the railing this will complete the bridge, 5,818.5 ft long with two 36-ft roadways, two 3-ft sidewalks, a 4-ft median and a vertical clearance of 140 ft.

Work is for the Texas Highway Department. Randle B. Alexander is bridge engineer and Lewis H. White is senior field engineer.

The bridge was designed to be let in five contracts. These include one for prestressed girders and one for reinforced concrete bents and piers (for prices see ENR December 20, 1956, p. 61), the two contracts for truss spans and girder units reported in the table below and one contract for the entire railing, to be let at some future date.

The $3,502,483 contract for five steel truss spans went to United States Steel Corporation, American Bridge Division. The price is 21.7% above the engineer's estimate and 1.15% below the only other bid.

Two deck truss spans are 271 ft long and a three-span cantilever truss unit with suspended tied arch is 312.25-620-312.25 ft long. Work does not include deck slab.

Previous bids on the truss units with deck slab were rejected.

The $2,040,101 contract to J. A. Raines of Muskogee, Okla., is for 10 welded plate girder spans and for lightweight concrete floor slab on both the plate girder and the truss spans. The price is 22.2% below the engineer's estimate and 15.2% below the second low of seven bids. The girder spans include two of 90.25 ft, six of 151 ft and two continuous plate girders, 301 and 640 ft long.

Specifications require a compressive strength of 3,000 lb for both class A and class X (lightweight) concrete.

Prevailing wage rates are $1.00 for unskilled labor, $1.25 for semi-skilled labor, $1.50 for reinforcing steel setters, $1.75 for concrete finishers, form builders and welders and $2.25 for structural steel workers.

Bidders on the two contracts include:

Steel Truss Spans, Length: 0.339 mile

1C United States Steel Corp., American Bridge Division, Dallas, Texas	$3,502,483
2 Bethlehem Steel Co., Bethlehem, Pa	3,543,227
EE Lewis H. White, Corpus Christi, Texas	3,167,000*

Bids: 12-11-56 Items	Unit	Quantity	Unit Prices 1C	2
Structural steel, carbon	lb	5,348,700	$0.334	$0.3455
low alloy	lb	4,433,000	0.349	0.3505
Truss shoes	ls	job	160,600	131,200
Navigation & beacon lights	ls	job	8,300	10,285

Time to complete: 630 calendar days
Liquidated damages: $75 per day

*Includes 10% for engineering and contingencies (taken out for comparison with contract).

Plate Girder Units & Deck Slab for Truss Units, Length: 0.723 mile

1C J. A. Raines, Muskogee, Oklahoma	$2,040,101
2 Guy H. James Construction, Oklahoma City, Oklahoma	2,406,582
7 Heidenfels Bros., Corpus Christi, Texas	2,678,348
EE Lewis H. White, Corpus Christi, Texas	2,811,000

Bids: 1-23-57 Items	Unit	Quantity	Unit Prices 1C	2
Conc, cl A, 403&spl	cy	841.4	$51.40	$65.00
cl X, lightweight	cy	5,814.4	56.75	72.00
Steel, reinf, 405&spl	lb	1,388,405	0.14	0.16
str, pl gird, 407&spl	lb	6,782,300	0.216	0.25
Rigid met conduit, 1¼"	lf	7,857	1.60	2.00
1½"	lf	135	1.15	4.00

Time to complete: 720 calendar days
Liquidated damages: $75 per day

Steel Truss Spans with Deck Slab—Rejected

1 United States Steel Corp., American Bridge Division, Dallas, Texas	$3,911,817
2 Bethlehem Steel Co., Bethlehem, Pa	3,987,183

Bids: 10-17-56 Items	Unit	Quantity	Unit Prices 1C	2
Conc, cl X, lightweight	cy	3,050.4	$84.00	$89.00
Steel, reinf, 405 & spl	lb	640,932	0.188	0.2285
str, carbon	lb	5,394,000	0.336	0.3455
low alloy	lb	4,433,000	0.349	0.3501
Truss shoes	ls	job	160,600	131,200
Navig & beacon lights	ls	job	8,300	10,285
Rigid met cond, 1¼"	lf	3,595	1.81	2.80
1½"	lf	80	3.60	5.40

Spillway Excavation for Oahe Reservoir

In addition to moving 18,600,000 cu yd of material and wasting of overburden and shale the contractor for Stage II of Oahe Reservoir Spillway must provide ferry service for equipment and personnel (but not tourists or general public). The Oahe Project is near Pierre, S. D. J. W. Sibert, Jr., is area engineer for the Omaha District of the Corps of Engineers.

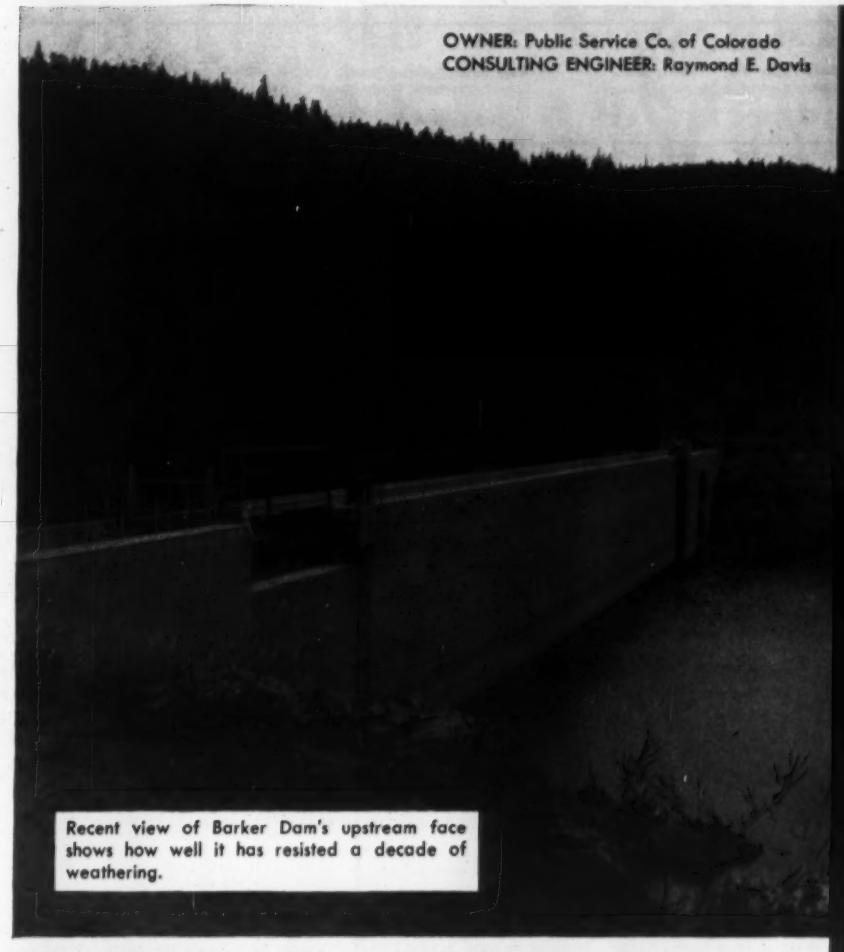
The $5,707,648 contract went to Guy F. James Construction Co., and J. H. Beckman Construction Co., Pierre. The joint venture's low bid is 7.7% above the engineer's estimate but 4.7% below the second low bid. They have 22 months to complete the job.

The six bidders include:

1C Guy H. James Const. Co. and J. H. Beckman Const. Co., Pierre, S. D.	$5,707,648
2 C. F. Lytle Co. and Ace Const. Co., Sioux City, Iowa	5,989,800
6 S. J. Groves & Sons Co., Minneapolis, Minnesota	7,967,500
EE Omaha District, Corps of Engineers, U. S. Army	5,297,998

Bids: 11-28-56 Items	Unit	Quantity	Unit Prices 1C	2
Excavation	cy	18,600,000	$0.302	$0.318
Ferry service				
to 8-1-58	ls	job	82,048	60,000
after 8-1-58	month	3	2,800	5,000

To be started: about 2-15-57 To be completed: 12-15-58
Liquidated damages: $200 per day



OWNER: Public Service Co. of Colorado
CONSULTING ENGINEER: Raymond E. Davis

Recent view of Barker Dam's upstream face shows how well it has resisted a decade of weathering.

Crane placed slabs during 1946 refacing operation. Dam is 175 feet high and 720 feet long at crest.

Coarse aggregate, placed between slabs and old face, was later consolidated with Intrusion grout.

TEN-YEAR PROGRESS REPORT ON BARKER DAM SHOWS THAT...

Prepakt restoration produces durable, long-lasting results

■ In 1946 Barker Dam near Boulder, Colorado, frost-damaged and leaking, was restored by INTRUSION-PREPAKT. A recent examination revealed that the dam is in excellent condition . . . and should remain so indefinitely.

This project indicates both the enduring nature of I-P maintenance work and its versatility. Repair work on Barker Dam was handled completely by INTRUSION-PREPAKT and required (1) grouting permeable foundation material, (2) removing the disintegrated upstream face, and (3) increasing the stability of the structure by an addition to the upstream face.

Refacing was started during seasonal low reservoir by removing deteriorated concrete, placing precast concrete slabs over entire face and filling the space between slabs and face with coarse aggregate. When reservoir had nearly filled, the entire structure was bonded together in a continuous 10-day INTRUSION grouting operation.

In addition to long-lasting repairs, use of I-P methods and materials reduced possibilities of cracking from stress and temperature changes, avoided loss of a season's run-off of water, permitted completion in minimum time and assured superior concrete quality.

For enduring maintenance of concrete and masonry structures, contact: INTRUSION-PREPAKT, Inc., Room 568E, Union Commerce Bldg., Cleveland 14, Ohio. In Canada: INTRUSION-PREPAKT, Ltd., 159 Bay St., Toronto, Ontario.

INTRUSION-PREPAKT, INC.

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Intrusion and Prepakt are trade marks of Intrusion-Prepakt, Inc., whose methods and materials are covered by U. S. Patents Nos. 2313110, 2655004, 2434302 and others, also patents pending.

Materials and Labor Prices — Market Quotations by ENR Field Reporters

See following ENR issues for OTHER PRICES:

- Wood Products, Glass, Explosives, Chemicals: Last, Feb 21; Next, Mar 21
- Clay Products, Lime, Plaster, Paint, Roofing: Last, Feb 28; Next, Mar 28
- Wage Rates, Building Board, Lath, Insulation: Last, Feb 28; Next, Mar 28
- Cement, Aggregate, Ready-Mixed Concrete, Asphalt: Last, Mar 7; Next, Apr 4

IRON AND STEEL PRODUCTS — PER 100 LBS. BASE MILL PRICES

	STRUCT SHAPES—	PLATE CARBON STEEL	REINF BARS billet	RIVETS ½-in. structural	SHEET PILING Base	STEEL RAILS Per Net Ton Standard	STEEL RAILS Per Net Ton Light	TRACK SUPPLIES Angle Bars	TRACK SUPPLIES Std Spikes	TRACK SUPPLIES Tie Plates	TRACK SUPPLIES Track Bolts
Birmingham Area	$5.00	$4.85	$5.07½	$10.85	.....	$101.60	$120.00	$6.35	$8.775	$6.025	.....
Chicago Area	5.00	4.85	5.07½	10.85	$5.90	101.60	120.00	6.35	8.775	6.025	.....
Pittsburgh Area	5.00	4.85	5.07½	10.85	5.90	101.60	120.00	6.35	8.775	6.025	$13.10
Buffalo Area	5.00	4.85	5.07½	10.85	5.90	101.60	120.00	6.35	8.775	6.025	13.10
Cleveland	.....	.....	5.07½	10.85	5.90	.....	.....	.....	.....	.....	13.10
Youngstown Area	.....	.....	5.07½	.....	.....	.....	.....	.....	8.775	.....	.....
Geneva	5.00	4.85	5.175	.....	.....	.....	.....	.....	.....	.....	.....
Los Angeles	5.70	.....	5.775	.....	5.90	.....	.....	.....	8.775	.....	.....
Pueblo	.....	.....	.....	.....	.....	.....	.....	6.35	8.775	6.025	.....

IRON AND STEEL PRODUCTS — F.O.B. WAREHOUSE, PER 100 LBS., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS Per 100 lb., base price 5 tons to carload lot New billet	REINFORCING BARS Per 100 lb., base price 5 tons to carload lot Rail steel	EXPANDED METAL LATH Per 100 sq. yd., carload lots Std. diamond mesh, 3.4 lb.	EXPANDED METAL LATH Per 100 sq. yd., carload lots Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 sq ft., carload lots fob mill
Atlanta	$8.44	.....	$8.90[e]	$52.00	$57.00	
Baltimore	8.67	8.10[j]	.....	42.00	46.50	
Birmingham	8.35[l]	8.07[t]	8.07[t]	65.00[p]	71.00[p]	
Boston	9.10[a]	8.67	8.67	48.00	52.50	
Chicago	8.35	6.81[gu]	6.81[gu]	52.00[‡]	63.00[‡]	
Cincinnati	8.89[ak]	8.43[rv]	.....	43.50[mn]	48.00[mn]	
Cleveland	8.57	6.79[c]	.....	43.50[‡]	48.00[‡]	
Dallas	9.95	8.50	8.50	57.00	62.00	
Denver	9.80	8.45[c]	.....	57.00[n]	63.00[n]	
Detroit	8.74	8.13	.....	56.00	63.00	
Kansas City	8.87[s]	8.74	.....	49.00	60.00	
Los Angeles	9.00[fd]	7.35	.....	57.50	63.50	
Minneapolis	8.66[d]	8.91[b]	8.91[b]	41.50	46.00[•]	
Montreal	$8.75‡ C/8.05–8.45 A	7.75/8.95[k]	7.75/8.95[t]	65.70[h]	70.20[h]	
New Orleans	.....	7.70[akn]	.....	45.50	50.00	
New York	8.91	7.85[ary]	7.85[ary]	50.50[no]	57.00[no]	
Philadelphia	8.04	7.14	.....	42.50[‡]	47.00[‡]	
Pittsburgh	7.43	6.57	.....	42.50	47.00	
St. Louis	8.67[s]	8.05[c]	8.05[c]	60.00[l]	62.00[l]	
San Francisco	9.15	9.10[j]	.....	47.50	53.00	
Seattle	9.35	8.50[e]	.....	62.00[nr]	68.00[nr]	
Toronto	8.75*	7.60	7.60	56.00[nq]	59.00[nq]	

Quantity extras, per cwt: under 100#, +$1; 100-399#, +50¢; 400-999#, +30¢; 1000-1999#, +20¢; 2000-4999#, +10¢; 10,000-19,999#, —10¢; 20,000-29,999#, —20¢; 30,000# and up, —70¢

EXTRAS, per cwt—*Quantity: less than 700#, +50¢; 700-1499#, +25¢; 1500-7999#, +10¢. *Size: #7 and heavier, +$3.50; #6, +$1.40; #4 +1.00; #3 +70¢; #6, #7 #8, #9, #10, #11 +60¢. *Bending: heavy, +60¢; light, +$2 (except in New York City and surrounding metropolitan area where bending must be done on the job). *Engineering (details and placing from designs by others): over 500 tons, +4¢; 200-500 tons, +5¢; but not over 200 tons, +6¢ but not over $4500; 20-200 tons, +60¢ but not over $2000; 5-20 tons, +70¢ but not over $340; under 5 tons, +$4 but not over $70. *Design only: +60¢.

WELDED FABRIC REINFORCING: 4 × 10 in., No. 8 & 10 wire—Joliet, Ill., Donora, Pa., Monessen, Pa.—$3.66; 4 × 12 in., No. 8 & 12 wire—Joliet, Ill., Donora, Pa., Monessen, Pa.—$3.43; 6 × 6 in., No. 6 & 6 wire—Joliet, Ill., Donora, Pa., Monessen, Pa.—$3.54

*‡ Delivered *a 2000-9999# *b 10,000-19,999#, fob city *c 20 tons or over *d 10,000-19,999# *e Intermediate strength *f Incl. delivering in free zone *g CL *h list price; dominion tax exempt; add provincial and municipal taxes *j add dominion, provincial and municipal sales taxes *k fob city *l delivered; contractor to do unloading *m copper alloy *n LCL *o asphalt coated *p del. of 500 sq. yd. or more. *r 2% off for cash *s 2,000-4,999# *t add 10¢ del. *u add 6.25¢ switch *v incl 15¢ del. *w 5-10 tons *x add 5¢ switch *y add 30¢ del. *z add 10¢ del. *A American made. *C Canadian made. *• Aver. of Canadian & American.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE PRICE INDEX[a]	ASBESTOS CEMENT PIPE per lin. ft. f.o.b. city 6" Pr Cl. 150	ASBESTOS CEMENT PIPE per lin. ft. f.o.b. city 12" Sew Cl. I	VITRIFIED SEWER PIPE Per foot, Delivered ASTM C13-44T std. 8 in. s.s.	std. 12 in. s.s.	24 in. ds.	36 in. ds.	CLAY DRAIN TILE ASTM C4-24 PER 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered: ASTMC 14-41 12 in.	24 in.
Atlanta	123.5	$1.64	$2.68	$.58	$1.00	$4.40	$14.50	$225.00	.....	$1.55[m]	$4.40[m]
Baltimore	133.3	1.64	2.46	.665	1.28	5.08[s]	12.71	187.80	$289.20	1.01	2.75[m]
Birmingham	119.0	1.64	2.68	.46	.86	3.70[w]	10.37[w]	260.00[‡]	440.00[‡]	1.25[m]	2.75
Boston	136.2	1.66	2.46	.812[qrt]	1.566[qrt]	6.525[qrt]	.....	215.40[r]	330.60[r]	1.56[mg]	3.47[mg]
Chicago	134.1	1.64	2.46	.93[m]	1.78[m]	7.52[m]	21.16[m]	220.00[n]	330.00[n]	1.30	4.00
Cincinnati	128.2	1.66	2.55	.665[t]	1.282[5t]	4.90[5t]	12.50[5]	240.00	370.00	.85[m]	3.25[m]
Cleveland	134.9	1. 66	2.55	.567[s]	1.0935[s]	4.545[t]	11.787[t]	155.40[m]	240.60[m]	.85[m]	3.50[m]
Dallas	131.0	1. 66	2.80	.439	.799	4.00[b]	9.17[b]	.....	.....	.63	1.86
Denver	141.4	1. 73	2.80	.47[n]	.84[n]	3.73[n]	.....	.....	.....	.74[m]	2.50[m]
Detroit	135.3	1.66	2.55	.85	1.60	6.45	17.50	340.00[m]	370.00[m]	.95	3.82
Kansas City	131.7	1.66	2.55	.61	1.105	4.54	12.75	260.00	485.00	.90	2.90
Los Angeles	141.5	1.73	2.46	.74[l]	1.61[l]	6.42[l]	15.36[l]	360.00[l]	530.00[l]	1.02	3.02[f]
Minneapolis	143.1	1.68	2.68	.86[mo]	1.55[mo]	6.70[mo]	.....	.....	.....	1.76[h]	4.74[h]
Montreal	.....	.....	.....	1.02[u]	1.80[u]	6.30[u]	12.00[u]	.....	.....	1.17[h]	3.11[j]
New Orleans	126.1	1.64	2.68	.535	.93	5.44	.....	370.00[p]	580.00[p]	.85	2.90
New York	131.7	1.66	2.46	1.02[z]	1.94	7.61	19.58	.....	.....	1.50	3.00
Philadelphia	131.0	1.64	2.46	.65	1.25	4.95[s]	12.65[s]	300.00[‡]	350.00[‡]	1.60[h]	3.95[h]
Pittsburgh	136.1	1.66	2.46	.468[m]	.864[m]	3.86[m]	9.78[m]	152.00	244.00	1.05[h]	2.50[h]
St. Louis	130.1	1.64	2.55	.59	1.08	4.45	10.80	180.00[l]	380.00[l]	1.45[5l]	3.10[5]
San Francisco	141.5	1.73	2.46	.78[d]	1.69[d]	6.72[d]	16.36[d]	320.00[l]	560.00[l]	1.05[m]	3.30[m]
Seattle	141.8	1.73	2.46	.67[b]	1.33[b]	6.84	.....	220.00[c]	.....	1.05[k]	3.10[k]
Toronto	.....	.....	.....	.76	1.425	6.00	.....	157.00	280.00	1.02	3.57

*‡ Delivered. *a PRICE INDEXES for CENTRIFUGAL CAST IRON PIPE (Include carload freight allowed to city). These also serve as the HISTORICAL RECORD of THE $ PER NET TON PRICE of CLASS B, B&S, PIT CAST IRON PIPE. F.O.B. Foundry Price Indexes Birmingham, Ala., 119.0; Burlington, N. J., 127.8. *b Extra strength ASTM C 200-44T *c 4-in., $130. *d $5361-A *e 30-in. *f 21 in. *g culvert pipe; reinforced, ASTM C 75-58 *h reinforced, ASTM C 76-41 *i reinforced, ASTM C 76-37 *j centrispun; no standard specs. in Canada. *k 2% off for cash *l fob plant *m truck delivery *n LCL delivered, fob truck *o listed price based on LCL (no min.) *p freight allowed to destination in city *q ASTM C 13-40 *r CL fob origin, freight allowed *s 2 ft lengths *t 3 ft lengths *u CESA A 60-1941 specs. used *v standard strength *w as; add 20% for d.s. *x Correction: Feb. $1.02

***WROUGHT STEEL PIPE**
(Full standard weight)
Discount from list; see footnotes

Mill	2½ & 3 in., Butt Weld Black %	2½ & 3 in., Butt Weld Galv. %	3½ to 6 in., Lap Weld Black %	3½ to 6 in., Lap Weld Galv. %	7 to 12 in., Lap Weld Black %	7 to 12 in., Lap Weld Galv. %	b Continuous
Lorain, Ohio	20 75	2 50	10 25a	+4 00a	+0 75a	+5 50a	+5 25a
Aliquippa, Pa	20 75	2 50	4 25a	+4 50	+0 50a	+5 50	+5 25a
Sparrows Pt., Md.	15 75	0 50	.....	.....	+9 50a	+14 50	+3 75a
Benwood, W. Va.	20 75	2 50	13 50a	+0 75a	+2 50a	+7 50	+21 50a[d]
Youngstown, O.	20 75	2 50	10 25	+4 00	.....	.....	
Indiana Harbor, Ind.	19 75	1 50	9 25a[d]	+3 50a	.....	.....	
Sharon, Pa.	20 75	2 50	10 25a	+5 50a			
Wheatland, Pa.	20 75	2 50	8 50a	+5 75a			
Etna, Pa	20 75	2 50	3 75a	+7 75a			
Portland, Calif.	7 75	+10 50	+2 75a[d]	+21 50a[d]			

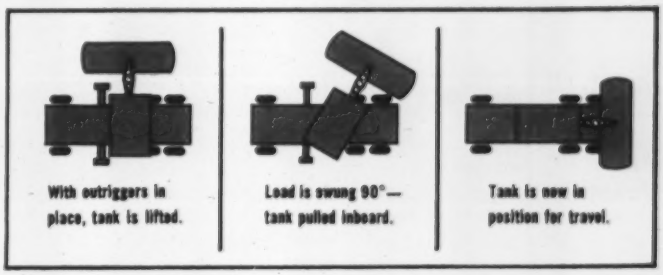
+Threaded and coupled. a 3½ to 4 in. d 6 in. weld. 5 and 6 in.

* WROUGHT STEEL PIPE: Deduct discounts shown above from the following standard list consumers carload prices to get mill price. List prices per ft.(*based on approx. 3200 per net ton): Butt Weld ¼ in., 8½¢; ⅜ in., 6¢; ½ in., 6¢; ¾ in., 7½¢; 1 in., 17¢; 1¼ in., 23¢; 1½ in., 27½¢; 2 in., 37¢; 2½ in., 58½¢; 3 in., 79½¢. Lap Weld 3½ in., 92¢; 4 in., $1.09; 5 in., $1.48; 6 in., $1.92. Add freight rates plus 3% transportation tax to get destination price.

WROUGHT IRON PIPE: List prices per ft. same as for wrought steelpipe, but add following "discounts" to get Pittsburgh mill price: Butt Weld—1 in. black, + 66.5%, galv., + 98.7%; 1¼ in. black, + 66.5%, galv. + 95.2%, 1½ in. black, + 61.7% galv, + 91.2%; Lap Weld —2½ in. to 3 in. black + 67.9% galv. + 98.7%; 4½ in. to 6 in. black + 64.7% galv. + 90.6% Add freight rates plus 3% transportation tax to get destination price.

HOW 17 TON TANKS ARE LIFTED AND TRANSPORTED WITH A BAY CITY CRANEMOBILE

Because a BAY CITY CraneMobile can be used to transport as well as lift, it's a doubly-handy machine to have working for you. The photo and accompanying sketches show this husky performer, owned by Leach Steel Corp. of Rochester, N. Y., moving one of 60 bulky 17-ton steel tanks. The CraneMobile's extreme stability, power, and balance fit it for dozens of job applications . . . it is a busy contractor's most versatile, most profitable piece of equipment. Available in four sizes with a choice of seven mountings . . . crane capacities from 15 tons up. Call your dealer or write direct for illustrated catalog.



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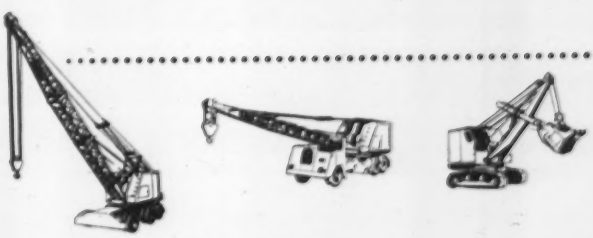
BAY CITY SHOVELS, INC. • BAY CITY, MICHIGAN

BAY CITY

SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS



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ONLY 60 FEET AWAY—apartment-house dwellers have a "ringside seat" as blast drops rock for quick removal. Du Pont 40% Red Cross Extra and MS Delays packed the power to excavate about 210,000 cu. yds. of bedrock—but kept vibration down. On completion, this development of six 22-story buildings will accommodate 1,481 family units.

Know-how plus Du Pont "Team" keep "straight-jacket" blasting in line

Subcontractors report good breakage with minimum vibration in crowded Bronx area . . . finish ahead of schedule

Though people live and work a stone's-throw away—blasting operations moved in high gear at this N. Y. C. Housing Authority development in south Bronx. Work on the 7-block project began late in May, 1956 and ended in November—ahead of schedule.

TAMPING 40% Red Cross Extra into hole for another shot. Next step: connecting up round with MS Delays. Built-up areas like this require "something extra"—and this Du Pont combination has it!

They were hemmed in by homes, office buildings and elevated train structures—but A. R. La Mura, Inc. is a firm that knows its job and knows its tools. From the start,. La Mura used a Du Pont blasting "team" of 40% Red Cross Extra and MS Delay Electric Caps. Result: good breakage and the minimum of vibration that "delicate" blasting demands.

A workman's only as good as his tools. So use blasting supplies you can count on—Du Pont blasting supplies. Contact your representative or write: E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Bids Asked—Low Bidders—Contracts Awarded—First Section—

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 36, N. Y., ELSIE EAVES, Manager
J. A. MAHONEY, M. WETZEL, M. E. SCIORRA, F. S. DEMBEK, Reports.
J. H. WEBBER, M. R. ROESSLER, E. R. HUBER, Statistics.

MIDDLE ATLANTIC

BUILDINGS—BA

▲ **N. Y., Colonie**—SCHOOL—BA 3/19—Bd. Educ., Central School Dist., Junior-Senior High School. $3,000,000. Plans deposit $50. Henry Blatner, 11 N. Pearl St., Albany, archts.

▲ **N. Y., Rochester**—SCHOOL—BA 4/2—Bd. Educ., 13 S. Fitzhugh St., 340,000 sq. ft. East High School. $5,500,000. Faragher & Macomber, 900 Power Bldg., Rochester, and Moore & Hutchins, 215 E. 37 St., New York, archts. CD 10/11.

HEAVY CONSTRUCTION—LB & CA

▲ **Merritt-Chapman & Scott Corp.**, 260 Madison Ave., New York, N. Y. LB **$10,764,581.** (8 bidders) constr. Fort Pitt Tunnel in Pittsburgh, linking new Fort Pitt Bridge with Saw Mill Run intersection of the Penn-Lincoln Parkway, PENNSYLVANIA. State Hy. Dpt., 506 N. Office Bldg., Harrisburg, Pa. Bids Mar. 1. CD 12/26.

▲ **PENNSYLVANIA AND NEW JERSEY**—Pennsylvania R.R. Co., C. J. Henry, ch. engr., Suburban Station Bldg., 1617 Pennsylvania Blvd., Phila. 4, Pa.,
John F. Casey Co., Box 1888, Pittsburgh, Pa. LB **$2,076,980.** Contr. No. 1 altering substructure of Delair Bridge No. 207 over Delaware River, Phila., Pa. Bids Feb. 8. CD 1/3.

BUILDINGS—LB & CA

▲ **Brady Constr. Co., Inc.**, 605 W. 47 St., New York 19, N. Y. CA **$2,436,000** (8 bidders) general constr. JUNIOR HIGH SCHOOL 180, Seaside Ave. between Beach Channel Dr. and Rockaway Freeway, Queens Boro, NEW YORK. Director, Bureau Constr., 42-15 Crescent St., Long Island City, N. Y. CD 1/21, under LB.

▲ **Mars Associates & Normel Constr. Co.**, 271 Church St., New York 13, N. Y. CA **$1,770,000** (9 bidders) general constr. PUBLIC SCHOOL 289, Kingston Ave. between Prospect Place and St. Marks Ave., BROOKLYN, N. Y. Director, Bureau Constr., 42-15 Crescent St., Long Island City 1, N. Y. CD 2/4, under LB.

▲ **Colmar Constr. Co.**, 364 Gold St., Brooklyn 1, N. Y. LB **$3,831,000** (5 bidders) general constr. Sheepshead Bay HIGH SCHOOL, Batchelder and Coyle Sts., Aves. X and Y, BROOKLYN, N. Y. Director, Bureau Constr., 42-15 Crescent St., Long Island City 1, N. Y. Bids Feb. 28. CD 1/29;
C. K. Rehner, Inc., 41-20 Skillman Ave., Woodside, N. Y. LB **$394,455** (8 bidders) plumbing work (Brooklyn, N. Y.);
Heckler Electric Co., 44 Schenectady Ave., Brooklyn 13, N. Y. LB **$749,400** (12 bidders) electric work (Brooklyn, N. Y.);
Raisler Corp., 129 Amsterdam Ave., New York 23, N. Y. LB **$566,425** (6 bidders) heating work (Brooklyn, N. Y.).

▲ **Grayco Builders**, 106-21 Continental Ave., Forest Hills, N. Y. CA **$1,793,000** (8 bidders) general constr. PUBLIC SCHOOL 146, Cauldwell Ave. and E. 165 St., Bronx Boro, NEW YORK, N. Y. Director, Bureau Constr., 42-15 Crescent St., Long Island City, N. Y. CD 1/17, under LB.

▲ **Wilaka Constr. Co., Inc.**, 11 E. 44 St., New York 17, N. Y. CA **$2,393,000** (7 bidders) general constr., JUNIOR HIGH SCHOOL 149, Willis Ave. between 144 and 145 Sts., NEW YORK, N. Y. Director, Bureau Constr., 42-15 Crescent St., Long Island City 1, N. Y. CD 1/22, under LB.

▲ **George A. Fuller Co.**, 597 Madison Ave., New York, N. Y. CA Est. **$40,000,000.** 52 story OFFICE, Madison, Park Aves., 47 and 48 Sts., NEW YORK, N. Y. Union Carbide & Carbon Corp., 30 E. 42 St., New York 17, N. Y. CD 8/18/55.

▲ **James King & Son, Inc.**, 350 Fifth Ave., New York, N. Y. LB **$3,032,700.** general constr. HOSPITAL, addns., alterations, SCHENECTADY, N. Y. Ellis Hospital, Nott St., Schenectady, N. Y. York & Sawyer, 101 Park Ave., New York, N. Y., archts. Bids Feb. 20.

▲ **Caristo Constr. Corp.**, 105 Court St., Brooklyn 2, N. Y. CA **$2,235,000** (9 bidders) general constr. JUNIOR HIGH SCHOOL 194, 17 Ave., 17 Rd., 154 to 157 Sts., Queens Boro, WHITESTONE, N. Y. Director, Bureau Constr., 42-15 Crescent St., Long Island City 1, N. Y. CD 1/24, under LB.

▲ **Henry Schwartz**, Elkins Park, Pa. Separate Contract. **$2,500,000.** SHOPPING CENTER; **$5,000,000.** RESIDENTIAL DEVELOPMENT, 300 units, Second Street Pike in Upper Southampton Twp., SOUTHAMPTON, PA. CD 10/24.

▲ **Modern Constr. Co.**, 8500 Defense Hy., Lanham, Md. Owner Builds. **$1,800,000.** 100 HOMES, Fourth Sect. of Carrolton, LANHAM, MD.

▲ **Banks & Lee, Inc.**, Tower Bldg., Wash., D. C. CA **$1,339,000.** Buck Lodge Road JUNIOR HIGH SCHOOL, Hyattsville, UPPER MARLBORO, MD. Prince George's Co. Bd. Educ., Upper Marlboro, Md. Bids Feb. 27. CD 2/5.

SOUTH

HEAVY CONSTRUCTION—BA

▲ **Ky., Louisville**—BA 3/26—Louisville Water Co., 435 S. Third St., Contr. A, clarifier basins, general constr., Contr. B, clarifier basins, basin equip. **$1,500,000.** Plans deposit $15. Alvord, Burdick & Howson, 20 N. Wacker Dr., Chicago 6, Ill., engrs.; adv. ENR 3/14. CD 11/17/55.

BUILDINGS—SLC

▲ **Ga., Athens**—PLANT—Westinghouse Electric Corp., 3 Gateway Center, Pittsburgh, Pa., soon lets contract distribution transformer mfg. plant. $25,000,000. Lockwood-Greene Engineers, Inc., Montgomery Bldg., Spartanburg, S. C., engr.

HEAVY CONSTRUCTION—LB & CA

▲ **VIRGINIA**—The Richmond-Petersburg Turnpike Auth., 1015 E. Main St. or by mail P. O. Box 1-R, Richmond, Zone 2.
Wright Contg. Co., P. O. Box 38, Odenton, Md., CA **$2,995,063.** Contract C-3G, Section 3, grading, drainage, paving, structures from point 100 ft. north of Ruffin Rd. to James River Bridge City of Richmond. Bids Jan. 24. CD 2/15, under LB.

▲ **NORTH CAROLINA**—State Hy. & P. Wks. Comn., Raleigh,
N. C.—**F. D. Cline Paving Co.**, Box 349, Raleigh, N. C., LB **$149,075,** est. $150,000-$175,000. resurf. b. conc. and surf. 5.44 mi. US 301 and NC 42 F 394 (11), Wilson Co.; LB **$94,346,** est. $75,000-$100,000. S. A. base and b. conc. surf. 10.71 mi. US 264, B. S. 4-6-31-179, B. S. 4-6-32-161, Code 5900-401, Code 5900-421, Johnson and Nash Counties; LB **$118,743,** est. $100,000-$125,000. STBC and S. A. base, surf. 4.33 mi. U. S. 301, Proj. 5685, SF 699 (3), Code 5900-829, Moore Co.;
N. C.—**Nello L. Teer Co.**, Trust Bldg., Durham, N. C., LB **$219,529,** est. $225,000-$250,000, CABC or PCSBC and BST and 8.8 mi. Proj. 4-209, S-867 (1), Nash Co.;
N. C.—**Midstates Contractors, Inc.**, Hickory, N. C., LB **$114,587.** b. conc. binder and surf. 12.2 mi. US. 19 Proj. B. S. 14-6-99-133, B. S. 14-6-99-134, Swain Co.;
N. C.—**Talman Constr. Co.**, 919 S. 2 St., Wilmington, N. C., LB **$98,135,** est. $100,000-$125,000. STBC, b. conc. binder and surf. 1.87 mi. B. S. 3-7-25-30, New Hanover Co.;
N. C.—**Grannis & Sloan, Inc.**, Box 3066, Fayetteville, N. C., LB **$257,765,** est. $250,000-$300,000; grading 3.04 mi. N. C. 54 (Relocation) Proj. 4612-S-891 (1), Orange Co.; LB **$374,615,** est. $300,000-$400,000. grading 5.13 mi. NC 27, Proj. 6860, F 592 (2), B. S. 10-6-68-150, Stanley Co.;
N. C.—**Brown Paving Co.**, Box 484, Lexington, N. C., LB **$758,542,** est. $400,000-$500,000 or over, STBC, Bit. surf. b. conc. binder & surf., 10.6 mi. US 301, Proj. 4376, IN703 (5), Harnett and Johnston Counties;
N. C.—**Barrus Constr. Co.**, Box 395, Kinston, N. C., LB **$1,196,044,** est. $400,000-$500,000 or over, CABC, b. conc. binder and surf. 10.53 mi. US 70, Proj. 2154, F-168 (14), Craven Co.; LB **$331,982,** est. $300,000-$400,00, STBC S. A. or b. conc. base and surf. 12.77 mi. Proj. 2-255, S-44 (3), Greene and Lenoir Counties;
N. C.—**Connell Constr. Co.**, Warrenton, N. C., LB **$148,797,** est. $125,000-$150,000. CABC and BST 3.97 mi. Proj. 1-402, S-885 (1), Gates Co.;
N. C.—**Bryan Rock & Sand Co.**, Raleigh Bldg., Raleigh, N. C. LB **$83,262,** est. $75,000-$100,000. CABC and BST 3.5 mi. Proj. 5-255, S-908 (1) Granville Co.;
N. C.—**Thompson-Arthur Paving Co.**, Box 1197, Greensboro, N. C. LB $221,135, est. $225,000-$250,000. CABC and b. conc. binder and surf. 13.55 mi. US 64, Proj. 5846, F-645 (10), Randolph Co.;
N. C.—**Burns & Spangler**, 600 Peach St., Shelby, N. C. LB **$174,611,** est. $200,000-$225,000. grading 922 mi. US 70 (Relocation) Proj. 6248, Catawba Co. Bids Feb. 26. CD 2/19.

▲† **Robert E. Lee Co.**, Manning, S. C., LB **$1,761,622.** primary runway extens. and lighting and appurtenances, Charleston Air Force Base, No. 38-081-57-22, CHARLESTON, S. C. U. S. Eng., 31 Customhouse, Charleston, S. C. Bids Feb. 25. CD 1/23.

▲ **FLORIDA**—State Road Dpt., Tallahassee,
R. H. Wright & Son, Inc., Box 781, Fort Lauderdale, Fla., CA **$1,362,891.** limerock base with Type 1, b. conc. surf. course, binder course, twin 120 ft. concrete slab bridges on concrete or composite piling 3.011 mi. SR 5 (US 1) F.A. Proj. F 003-1 (1), Job 9002-205, Monroe Co. Bids Dec. 13, awarded Feb. 25. CD 12/19, under LB.

▲ **MISSISSIPPI**—State Hy. Dpt., T. C. Robbins, dir., Jackson,
Miss.—**Boyd Constr. Co.**, Grenada, Miss. CA **$2,285,304** est. $2,630,000. grade, culverts, box bridges, bridges grade separation structures 6.608 mi. U. S. Hy. No. 51 between Senatobia and Coldwater, Proj. I 091-4 (3), Tate Co.;
Miss.—**R. B. Tyler Co., Inc.**, 1446 Levering St., Louisville, Ky. CA **$1,849,684,** est. $2,000,000. grade, drain, culverts, box bridges, grade separation structures, base surf. 3.292 mi. U. S. Hy. No. 51 between Jackson and Ridgeland, Proj. I 091-2 (14), Hinds Co.;
Miss.—**Pigford-Noblin Constr. Co.**, Hy. 11 S, Meridian, Miss. CA **$576,707,** est. $618,000. grade, drain, culverts, bridges 7.43 mi. on Miss. Hy. No. 27 between Roselle and Oma, Proj. F 054-1 (8), Lawrence Co.;
Miss.—**Midstate Paving Co.**, Lamar Bldg., Meridian, Miss. CA **$230,469,** est. $235,000. grade, drain, culverts 10.27 mi. Miss. Hy. No. 13 between Maxie and Lumberton, Proj. S 0201 (4) A, Forrest Co.; CA **$204,016,** est. $290,000. incidental grade, drain base, double bit. surf. tr. 16.947 mi. on Miss. Hy. No. 59 between McLain and Beondale, Projs. S 0119 (3) and S 0119 (4), A, George and Greene Counties;
Miss.—**Brooks Constr. Co.**, Mendenhall, Miss. CA **$89,543,** est. $120,000. grade, drain, culverts 4.997 mi. Miss. Hy. No. 586 between Darbon and Foxworth, Proj. S 0186 (2) A, Marion Co.;
Miss.—**R. G. Brown Jr. & Co.**, Louisville, Miss. CA **$353,436,** est. $365,000. grade, drain, culverts bridge 7.347 mi. on Miss Hy. No. 63, between Leakesville and Avera, Proj. S 0231 (2) A, Greene Co.;
Miss.—**J. T. Reed, Contractor**, Louisville, Miss. CA **$217,954,** est. $265,000. grade, drain, culverts base and double bit. surf. tr. 6.737 mi. Miss. Hy. No. 21 between Ghoison and Shoqualak, Proj. S 0534 (4) A, Noxubee Co. Grand total **$5,807,106.** Bids Feb. 26. CD 2/14.

▲† **Allen M. Campbell Co.**, Box 836, Tyler, Tex. CA **$1,334,781.** enlisted men's barracks at U. S. Naval Auxiliary Air Station, NBy 6405, NEW IBERIA, LA. Eighth Naval Dist., Bldg. 16, U. S. Naval Station, New Orleans, La. CD 2/26, under LB.

BUILDINGS—LB & CA

▲† **Dawson Eng. Co.**, 10 Gillon St., Charleston, S. C., LB **$2,297,095,** improvs., renovations to 140 BARRACKS BLDGS., No. 38-042-57-70, FORT JACKSON, S. C. Dpt. of Army, Purch & Contg. Officer, Fort Jackson, S. C.

▲ **Arthur G. McKee Co.**, 2300 Chester St., Cleveland, O. CA BLAST FURNACE, ASHLAND, KY. Total Est. $20,000,000. Armco Steel Corp., Middletown, O. CD 3/1;
Dravo Corp., Neville Island, Pittsburgh, Pa. CA ore bridge (Ashland, Ky.);

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $44,000; other public works $73,000; industrial buildings $93,000; other buildings $344,000. Also Foreign projects of $100,000 and more in size of interest to American contractors.

By Regions & Classes of Construction

(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED

New England	**Middle West**
Middle Atlantic	**West of Mississippi**
South	**Far West**
PROPOSED WORK	
Water Supply	**Public Buildings**
Sewers, Waste Disposal	**Mass Housing**
Bridges	**Commercial Buildings**
Streets & Roads	**Industrial Buildings**
Earthwork, Waterways	**Unclassified**

In These Stages

PROPOSED WORK: Before and including appointment of engineers or architects.
BIDS ASKED: BA (new announcements only). For full calendar, see also preceding issues.
SOON LETS CONTRACT: SLC
LOW BIDDERS: LB On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.
CONTRACTS AWARDED: CA Except awards to low bidders previously reported in low bidder stage.
CD dates shown are of Construction Daily issue in which last previous report was published.
OWNERS, ENGINEERS, ARCHITECTS, CONTRACTORS are invited to report their new jobs for listing in these reports when they meet or exceed the size minimums shown above. Address these news releases to J. A. Mahoney, REPORTS, ENGINEERING NEWS-RECORD, 330 W. 42 St., New York 36, N. Y.

Symbols and Abbreviations Include:

†	**Federal Government**
▲	**Project of $1,000,000 or over.**
ENR	**Engineering News-Record**
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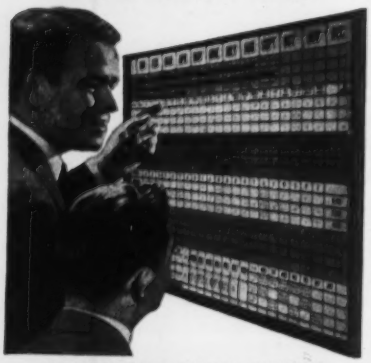

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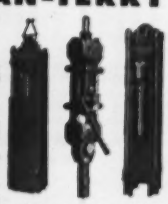

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United Engineering & Constructors, Inc., 1401 Arch St., Phila., Pa. CA boiler house and blooming mill addn. (Ashland, Ky.).

MIDDLE WEST

HEAVY CONSTRUCTION—BA

▲ **ILLINOIS**—BA 3/14—Illinois State Toll Hy. Comn., 20 N. Wacker Dr., Chicago,
Contract SN-8, furnishing, fabricating erecting structural steel for Bridge N-8-10 at intersection of Tri-State Rt. and S.W. Rt. between O'Hare Field and Chicago city limits. Joseph K. Knoerle & Assocs., 155 N. Wacker Dr., Chicago, section engrs.
Contract ST-6, furnishing, fabricating, erecting structural steel for Bridge T-6-5 at intersection of Tri-State Rt. and E-W Rt. Elmhurst. Joseph K. Knoerle & Assocs., 155 N. Wacker Dr., Chicago, section engrs. CD 5/11.

BUILDINGS—BA

▲ **Ill., Harvey**—HOSPITAL—BA 3/29—Ingalls Memorial Hospital, 155 St., Harvey, 3 story, bsmnt. brick hospital addn., 155 and Page Ave. $1,450,000. Wm. W. Benn & Assocs., 7 S. Dearborn St., Chicago, archts. CD 12/13.

BUILDINGS—SLC

▲ **Mich., Jackson**—HOSPITAL—Mercy Hospital, Charles G. Donahue, pres. Advisory Bd., Jackson, soon let contract Mercy Hospital addn., alterations. $1,365,000. Lee & Kenneth C. Black, 706 Capitol Savings & Loan Bldg., Lansing, and Forrest A. Gildersleeve, 1504 Reynolds Bldg., Jackson, archts. CD 11/21/55.

BUILDINGS—LB & CA

▲ **Wm. R. Goss Co.**, 8316 S. Ellis Ave., Chicago, Ill., CA $2,300,000. 3 story, brick, stone HIGH SCHOOL, CONVENT and GYMNASIUM, Locust and Roman Aves., WILMETTE, ILL. Sisters of Regina Dominican, Adrian, Mich. Bids Nov. 2. CD 10/31.

WEST OF MISSISSIPPI

BUILDINGS—BA

▲ **Kan., Wichita**—COURT HOUSE—BA 3/26—Comns. Sedgwick Co. Howard B. Scott, chn., 11 or 12 story brick county court house. $5,500,000. Thomas, Harris & Calvin, 321 W. Second St., archts. CD 12/14/55.

HEAVY CONSTRUCTION—LB & CA

▲ **Kansas City Structural Steel**, 2100 Metropolitan St., Kansas City, Kan. LB $1,471,047, total est. $3,224,360. mfg., delivery and erection of structural steel for Manchester viaduct over Missouri Pacific tracks in NE Ind. dist., beginning south approach to Chouteau Bridge at Gardner Ave. and runs southeast to Belmont Rd., KANSAS CITY, MO. City, City Hall, Kansas City, Mo., and Missouri Pacific R.R. Co., W. H. Hobbs, ch. engr., Missouri Pacific Bldg., St. Louis 3, Mo. Bids Feb. 26.

▲ **J. W. Bateson Constr. Corp., Inc.**, Box 13307, Walnut Hill Stations, Dallas, Tex., CA $2,572,943. general contract maintenance base at Love Field, DALLAS, TEX. City (Braniff Airways, lessee) City Hall, Dallas, Tex. Bids Feb. 18. CD 1/31.

▲† **C. F. Lytle Co.**, 250 Insurance Exchange Bldg., Sioux City, Iowa. LB $2,586,455, est. $2,324,482. Anchor Dam (earthfill) and access road, Owl Creek Unit, Big Horn Basin Div., Missouri River Basin Proj., Spec. DC 4830, WYOMING. Bureau Reclamation, Dpt. Interior, Thermopolis, Wyo. Bids Feb. 28. CD 2/21.

▲† **Foley Brothers, Inc.**, New York Bldg., St. Paul, Minn. LB $2,289,053, est. $2,793,771. Anchor Dam (concrete) and access road Missouri River Basin Proj., Big Horn Basin Div., Spec. DC 4831, WYOMING. Bureau Reclamation, Dpt. Interior, Thermopolis, Wyo. Bids Feb. 28. CD 2/21.

BUILDINGS—LB & CA

▲ **Dailey Constr. Co.**, 8510 Central Ave. N.E., Minneapolis, Minn. CA $3,000,000. general constr. 250 HOUSING UNITS, Rice Lake Rd., DULUTH, MINN. Beucler-Westman Realty Co., Providence Bldg., Duluth, Minn.

▲ **Walter Nashert**, 16 N.E. 27 St., Oklahoma City, Okla., CA $1,833,386, SEMINARY, OKLAHOMA CITY, OKLA. Bishop of Oklahoma City and Tulsa Diocese, 15 and Hudson Sts., Oklahoma City, Okla. Bids Jan. 31. CD 1/16.

▲ **Ralph M. Parsons Co.**, 617 South Olive St., Los Angeles, Calif., CA $2,500,000. design and construct addnl. plant facilities consisting of 2 hydro desulphurization operating units and appurtenances, BAYTOWN, TEX. Humble Oil & Refining Co., 1210 Main St., Houston, Tex.

FAR WEST

HEAVY CONSTRUCTION—BA

▲† **Calif., Sacramento**—RUNWAYS, etc.—BA 3/22—U.S. Eng., 1209 8 St., Sacramento, runways, misc. facilities, McClellan Air Force Base, Spec. 2016 ENG. 57-41 $2,500,000. CD 8/21.

BUILDINGS—BA

▲ **Ore. Pendleton**—SCHOOL—BA 3/26—School Dist. No. 16-C, Pendleton, Senior High School $2,000,000. Extended date. Culler, Gale, Martell & Norris, Realty Bldg., Spokane, Wash., archts. CD 2/8.

(Continued on page 96)

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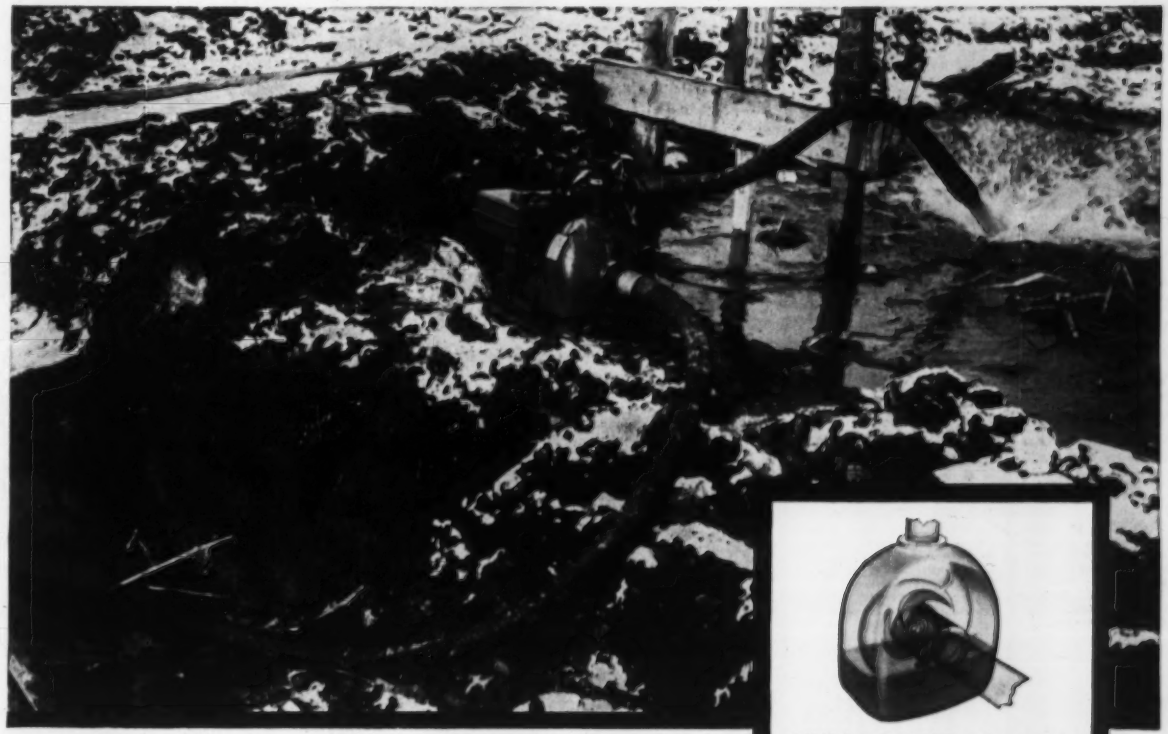

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(Continued from page 94)

HEAVY CONSTRUCTION—LB & CA

▲ **CALIFORNIA**—State Dpt. P. Wks., 1120 N. St., Sacramento,

Madonna Constr. Co., P. O. Box 910, San Luis Obispo, Calif. CA $1,473,000. constr. 5.9 mi. freeway, together with frontage roads, ramps, rein.-con. bridge and rein. box culvert on U.S. 101 between Wigmore and 1.7 mi. north of Los Alamos, Santa Barbara Co. CD 2/1, under LB.

▲† **Connolly-Pacific Co. & T. E. Connolly** 1925 Water St., Long Beach, LB $6,577,110 (5 bidders) subsidence remedial measures, Naval Shipyard, NBy 4182, Spec. 4182/56, LONG BEACH, CALIF. Eleventh Naval Dist., 1220 Pacific Highway, San Diego, Calif. CD 1/25.

BUILDINGS—LB & CA

▲ **Robert E. McKee General Contractor, Inc.**, 4700 San Fernando Rd., Los Angeles, Calif. LB $2,224,000. (5 bidders) general work, two 1-story ward bldgs., two 1 story security ward bldgs., covered passageways to link bldg. and site development at Fairview State Hospital, COSTA MESA, CALIF. State Div. Architecture, 1100 S. Grand Ave., Los Angeles, Calif. Bids Feb. 4. CD 2/1,

CANADA

HEAVY CONSTRUCTION—LB & CA

▲ **Narod Constr. Co. Ltd., and Dawson & Hall Ltd.**, 775 Clark Dr., Vancouver, B. C. LB $2,994,137 (3 bidders) Contract No. 4, 6 tunnel elements in connection with Deas Island Tunnel, Ladner, BRITISH COLUMBIA, B. C. Govt., Parliament Bldgs., Victoria, B. C. Bids Feb. 18. CD 2/11.

BUILDINGS—LB & CA

▲ **Bird Constr. Co. Ltd.**, Sargent and Erin Sts., Winnipeg, Man., CA Est. $1,500,000 (13 bidders) 1 story, no bsmnt., 400x400 ft. PLANT section, 85x96 ft. OFFICE section, structural steel frame, rein.-con. fdn., WINNIPEG, MAN. Dominion Envelope & Cartons (Western) Ltd., 111 Richmond St. W., Toronto, Ont. Bids Jan. 26, awarded Feb. 22, CD 12/26.

▲ **George A. Crain & Sons Ltd.**, 555 Cambridge St., Ottawa, Ont. CA about $1,500,000; (7 bidders) 4 story SCIENCE Bldg. on new 130-acre site., OTTAWA, ONT. Carleton College, 268 First Ave., Ottawa, Ont. Bids Feb. 12, awarded Feb. 25. CD 1/29

ALASKA

HEAVY CONSTRUCTION—LB & CA

▲† **Manson-Osberg Co.**, 1132 N. 128 St., Seattle 33, Wash., CA $7,246,724. installing Cold Bay and Cape Sarichef DEW system into Aleutian Islands with composite bldg., ammo storage bldg., wave-guide supports, etc., Inv. 57-58, ALASKA. U. S. Eng., 4735 E. Marginal Way, Seattle 4, Wash. Bids Feb. 21, awarded Mar. 1. CD 2/27, under LB.

LATIN AMERICA

HEAVY CONSTRUCTION—LB & CA

▲ **COSTA RICA**—Bureau P. Rd., Dpt. Commerce, Inter-American Hy., Wash., D. C.,

Beche and Sait Ltd. and Cia Constructora Quoris and Ulate Ltd., San Jose, Costa Rica, CA $4,791,693, Costa Rica Proj. 75-56-5, highway and bridge constr. from San Isidro Southeast to Platanares, Inter-American Highway. Bids Nov. 20. CD 11/23, under LB.

▲ **NICARAGUA**—Bureau P. Rds., Dpt. Commerce, Inter-American Hy. Office, General Services Bldg., Wash. 25, D. C.,

Nicaragua—**Compania Contratista Fisher de Guademala**, Guademala City and **James Stewart Co.**, 230 Park Ave., New York, N. Y., U. S. A., LB $4,776,730 Alt. No. 1 (4 bidders) Proj. 8-A approx. 48 mi. highway constr. between Sebaco and Condega for Inter-American Highways;

Nicaragua—**Thompson Cornwall, Inc.**, Chrysler Bldg., New York, N. Y., U. S. A., LB $4,493,410 Alternate No. 2, Proj. 8-A approx. 48 mi. hy. constr. between Sebaco and Condega for Inter-American Highways. Bids Feb. 28. CD 2/1.

PROPOSED PROJECTS

SEWERS, WASTE DISPOSAL

▲ **Ill., Stickney**—Incinerators, Inc., 6033 W. Roosevelt Rd., Cicero, incinerator, S. of Hawthorne Race Track. $2,000,000. Ragner Benson, Inc., 4744 W. Rice St., Chicago, consult. engr.

▲ **O., Eastlake**—Village, Village Hall, storm sewer program. $2,278,400. Morris E. Nall & Assoc., Prospect-4th Bldg., Cleveland, Zone 15, consult. engrs. Bids starting in June. CD 11/12.

▲ **Tex., Mesquite**—City, City Hall, major sewage disposal plant. $2,300,000. Homer A. Hunter & Assocs., 3708 Abrams Rd., Dallas, engrs. CD 1/9.

STREETS AND ROADS

▲ **NEW YORK**—Bureau Contracts & Accounts, The Gov. Alfred E. Smith State Office Bldg., Albany,

Albany Co.—Latham Circle, reconstr. portions of Rte. 9, Loudon Rd. and Rte. 7 Troy-Schenectady Rd., with a grade separation at their intersection, Rte. 9 will be four 12 ft. lanes of concrete pavement separated by 4 ft. concrete mall, FAI Proj., $600,000.

Latham-Watervliet Rte. 7, reconstr. portion of Rte. 7 the Troy-Schenectady Rd. from Latham to Watervliet, consisting of four 12 ft. lanes of c. conc. separated by 4 ft. flush concrete mall, FAI Proj., $700,000.

Erie Co.—constr. within the city of Buffalo approx. 5.1 mi. of Sects. I, II and III, and portion of IV between Michigan Ave. and city line of the Kensington Expressway and outside of the city approx. 3.1 mi. portion of Sect. IV and Sect. V from city line to Genesee St., FAI Proj., $7,000,000, CD 5/31/55.

reconstr. approx. 10.5 mi. of a total 12.8 mi. Union Rd., touring Rte. 188 between Southwestern Blvd. and Sheridan Dr., 4-lane hy. on existing location except through the Gardenville yards of the N. Y. Central R.R., FAI Proj., $1,500,000.

Montgomery Co.—reconstr. approx. 0.9 mi. Touring Rte. 10, about 1 mi. north of Hamlet of Ames, incl. new prestressed precast concrete bridge over Bowman Creek, FAI Proj., $175,000.

Schuyler Co.—reconstr. approx. 1.7 mi. County Road No. 398 extending from its jct. with County Road No. 388, the old Corning Rd. on west to its jct. with Genesee St. in village of Montour Falls, on the east, FAI Proj., $220,000.

Tompkins Co.—reconstr., wid'n., Rte. No. 13 from Schuyler-Tompkins Co. line to city line of Ithaca, section extending northerly from Schuyler Co. line intersection of Rtes. Nos 13 and 34 approx. 10 mi. long, will be reconstr. as a rein.-con. pavement; three existing bridges will be rebuilt, new location approx. 2 mi. long is proposed west of village of Newfield, addnl. lane of pavement on long hill south of intersection of Rtes. 13 and 34, FAI Proj., $2,500,000.

▲ **NEW YORK**—Bureau Contracts & Accounts, The Gov. Alfred E. Smith State Office Bldg., Albany,

Cattaragus Co.—constr. approx. 9.1 mi. Kennedy and Randolph By-passes between the Chautauqua-Cattaraugus Co. line and Steamburg, FAI Proj. $4,000,000. CD 5/7/54.

Erie Co.—constr. 2 mi. Scajaquada Creek Expressway from Niagara Thruway to Delaware Ave. interchange, FAI Proj., $1,500,000., CD 5/31/55.

Niagara Co.—constr. approx. 4 mi. in city of Niagara Falls of the Hyde Park Blvd. arterial from Buffalo Ave. to the North City Line, FAI Proj., $1,000,000.

constr. approx. 5.8 mi. of Ferry-Walnut Arterial in city of Niagara Falls between Main St. and city line on the east, FAI Proj., $1,000,000. CD 10/13/54.

▲ **NEW YORK**—Bureau Contracts & Accounts, The Gov. Alfred E. Smith State Office Bldg., Albany,

Delaware Co.—reconstr. approx. ⅝ mi. Touring Rte. 206 in village of Walton, FAI Proj., $100,000.

reconstr. approx. 14¾ mi. Rte. 30 between the hamlets of East Branch and Downsville, FAI Proj., $2,000,000.

Fulton Co.—reconstr. approx. 2.35 mi. of county hy. about ½ mi. west of Fulton-Saratoga Co. line, FAI Proj., $400,000.

Herkimer Co.—reconstr. 0.6 mi. Rte. 167 all on new location between point on Rte. 5, 0.4 mi. west of east corporate line of city of Little Falls, and point on Rte. 167, about ¼ mi. east of east corporate line of city of Little Falls, FAI Proj., $100,000.

Otsego Co.—reconstr. approx. 6 mi. Touring Rte. 166 between Rte. 20 and hamlet of Roseboom, FAI Proj., $1,000,000.

reconstr. approx. 8¼ mi. Touring Rte. 28 between Colliersville and Milford, FAI Proj., $1,500,000.

Steuben Co.—continuation of existing Dennison Parkway arterial Rte. 17 from Chestnut St. in city of Corning westerly for 1.4 mi. to point just west of Cutler Creek in village of Riverside, FAI Proj., $560,000.

wid'n., strengthening and resurf. approx. 2¾ mi. Rte. 36 from point about ¾ mi. north of village of North Hornell to four corners in village of Arkport, FAI Proj., $450,000.

EARTHWORK, WATERWAYS

▲† **Texas**—U. S. Govt. and International Boundary & Water Comn., USA Sec., Box 1859, El Paso, Dam No. 1, $3,118,000; Dam No. 2, $1,750,000; Dam No. 3 $2,350,000, constr. of control dams solely for irrigation on USA side in Rio Grande River Channel, below Anzalduas Dam, in Mission area. CD 7/21/53.

AIRPORTS

▲† **Calif., El Toro**—AIR STATION—Eleventh Naval Dist., 1220 Pacific Highway, San Diego., 1000 ft. extension at each end of runway 16L-34R, and airfield lighting at El Toro Marine Corps Air Station. $2,697,000. Quinton Engineers, Ltd., 812 W. 8th St., Los Angeles, Zone 17, consult engrs. CD 8/27.

▲† **Colo., Colorado Springs**—HOMES—Air Force Academy Constr. Agency, Colorado Springs, 1,555 homes for married academy personel. $25,600,000. CD 8/5/54.

▲ **N. Y., Utica**—HEADQUARTERS—Oneida Co. plans by Ammann & Whitney, archts.-engrs., 111 Eighth Ave., New York, Zone 11, 3 story, 139,000 sq. ft. concrete headquarters for Mohawk Airlines. $2,500,000.

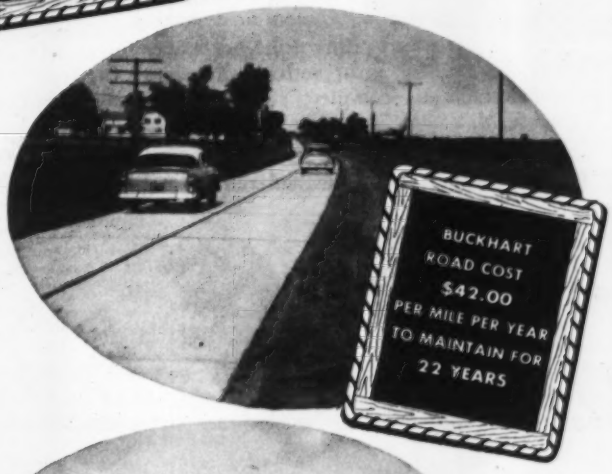
▲ **Que., Drummondville**—AIRPORT—Dpt. Transport, Hunter Bldg., Ottawa, Ont., airport. $2,000,000.

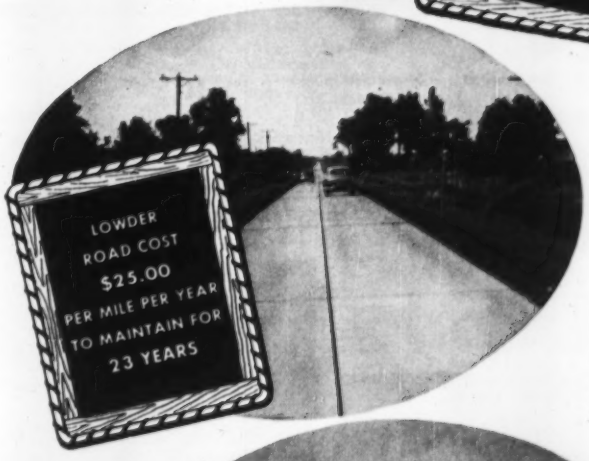
LATIN AMERICA

▲ **Mexico**—NATURAL GAS LINES—Petroleos Mexicanos (Pemex) Mexico City, plans 130 mi. 22 in. natural gas lines Reynosa to Monterrey to parallel an existing 14 in. line. $5,200,000.

▲ **Mexico, Guaymas**—FACTORY—Aceros de Sonora, Guaymas Sonora, Mexico, plans metals factory, $2,000,000.

(Continued on page 99)





OLD ROADS

prove concrete pavement has low maintenance cost

From 1928 to 1932 Sangamon County, Ill. built eight roads under a special law providing that when such roads were built with concrete they would be maintained by the state.

The maintenance record for these roads covers an average period of 23 years. The average maintenance cost per mile per year of only $55.57 is evidence of the low maintenance cost of concrete pavement.

Five of these roads are shown here along with their fine performance records.

Such records of low maintenance cost for concrete roads are not unusual. Similar low maintenance cost records can be found for countless concrete pavements throughout the nation. Concrete far excels all other types of pavement in long life, low maintenance cost and ***low annual cost.***

The low maintenance cost of concrete stands out in sharp contrast to the high maintenance cost record of other types of roads. Thousands of miles of such roads annually gobble up more and more of available highway funds for maintenance, leaving less and less money for new highway construction.

For help in building low-maintenance-cost concrete roads, write for free literature, distributed only in the United States and Canada.

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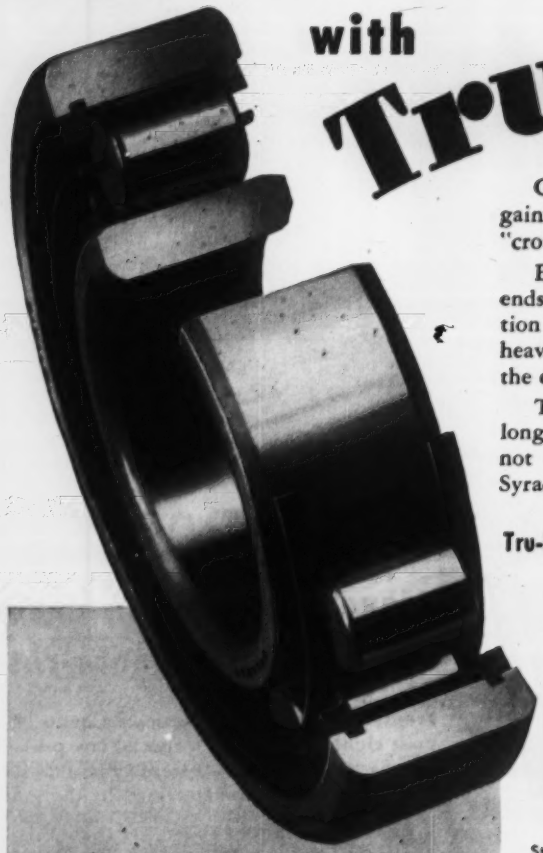

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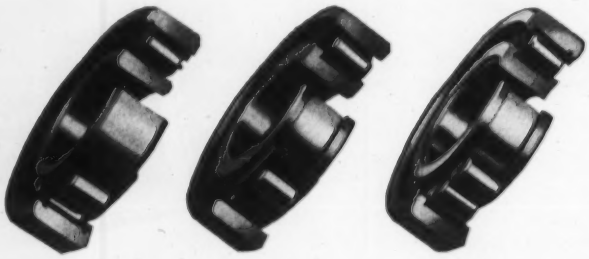
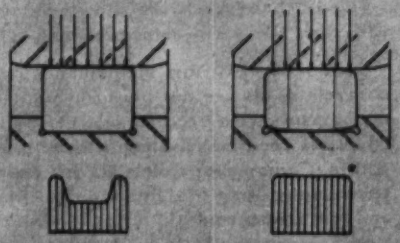


Stamped Steel Retainer with Guide Lips

Segmented Steel Retainer

Full Roller

Comparative Stress Patterns under Uniform Loads for Straight and Crowned Cylindrical Rollers



Stress pattern for a straight cylindrical roller under load. Note uneven end-loading.

Stress pattern for crowned roller under load. Crowning radius is exaggerated for clarity.

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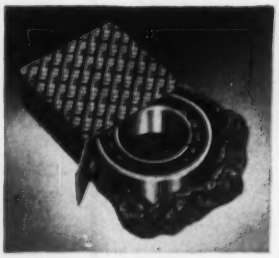

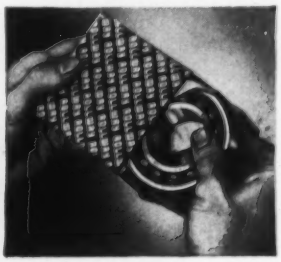

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(Continued from page 96)

PUBLIC BUILDINGS

▲ **Calif., Carmichael**—SCHOOL—San Juan Union High School Dist., c/o Supt., 2919 Fair Oaks Blvd., $2,500,000 bond election May 17, constr. Bella Vista High School and Encina High School, and another high school not named at Edison Ave. and Becarra St. $8,000,000.

▲ **Calif., La Puente**—HIGH SCHOOL—La Puente High School Dist., La Puente, bond election May 17, constr. Los Altos High School, Los Robles and Turnbull Canyon Rd. $3,500,000.

▲ **Conn., Hartford**—SCHOOL—State P. Wks. Dpt., 165 Capitol Ave., plans by Russell F. Hills, 130 Washington St., Albert I. Prince, Regional Vocational & Technical School, Flatbush Ave. $3,750,000. John P. Legnos, 30 Gillett St., Hartford, consult. engrs. A. John Macchi, 57 Farmington Ave., engr. CD 4/19/55.

▲ **Conn., Norwich**—MENTAL HOSPITAL, etc.—State P. Wks. Dpt., 165 Capitol Ave., Hartford, mental hospital bldg. to replace Dix Bldg. $3,000,000; replacing Cutter Bldg. $3,000,000, replacing Butler Bldg., $3,000,000, at Norwich State Mental Hospital.

▲ **Mo., Hannibal**—SCHOOL—Hannibal Public Schools, Bd. Educ., E. T. Miller, Supt. Schools, 1020 Broadway, voted $2,100,000 bonds Feb. 13, Junior High School, vocational and fine arts bldg., elementary school. Wm. B. Ittner, Inc., 408 Bd. Educ. Bldg., 911 Locust St., St. Louis, Zone 1, archts.-engrs. CD 8/14.

▲ **N. Y., Massapequa**—SCHOOL—Union Free School Dist., No. 23, plans by George J. Dippel, 124 Merrick Rd., Junior High School, Roosevelt Ave. and Spruce St., $3,450,000. To go ahead in May. CD 12/19.

▲ **N. Y., New York**—HOSPITAL—Dpt. P. Wks., Municipal Bldg., plans by DeYoung, Moscowitz & Rosenberg, 205 E. 42 St., Zone 17, alterations and reconstr. of Morrisania Hospital, HO-179. $5,000,000. To go ahead after 1957. CD 12/24/45.

▲ **N. Y., New York**—HOUSING—New York City Housing Auth., 299 Broadway, Zone 7, Cathay Houses, NYS-80, 625 units on site bounded by Pike, Madison, Rutgers and Cherry Sts., $12,000,000. CD 11/17/55.

▲ **N. Y., Plainview**—HIGH SCHOOL—Bd. Educ. plans by Knappe & Johnson, 390 E. 150 St., New York, Zone 55, high school, $4,000,000. CD 12/13/55.

▲ **O., Painesville**—HOSPITAL—Comrs. Lake Co., Court House, plans by The Ellerbe Co., E. 1 National Bank Bldg., St. Paul, Minn., 150-bed hospital, Willoughby. $3,500,000. CD 2/2/56.

▲ **Utah, Price**—SCHOOLS—Carbon County School Dist., Price, voted bonds Feb. 19, high school at Price, high school at East Carbon, Durrant School addn. at Price; Peterson School addn. in Sunnyside; new workshop and storage facilities in Price, $2,830,000. Ralph A. Edwards, 782 E. 21 South St., Salt Lake City, archt. CD 1/30.

COMMERCIAL BUILDINGS

▲ **Calif., Redondo Beach**—DEPARTMENT STORE—May Department Store Co., Railway Exchange Bldg., 611 Olive St., St. Louis, Mo., plans by Albert C. Martin & Assocs., archts.-engrs., 333 S. Beaudry St., Los Angeles, 350,000 sq. ft. shopping center, $6,000,000. CD 12/15/55.

▲ **Calif., Sunnyvale** — DEPARTMENT STORE — Harts' Dept. Store, Market and Santa Clara Sts., San Jose, plans by John S. Bolles, Pier 5, San Francisco, 3 story 63,000 sq. ft. Branch Department Store. $2,000,000. Bids in 2 weeks.

▲ **Conn., Hartford**—DEPARTMENT STORE—E. J. Korvette, Inc., 12 E. 46 St., New York, N. Y., modernizing, renovating vacant 9 story Wise-Smith Department Store, 915 Main St., incl. air-conditioning, modern lighting, escalators, etc. $3,000,000.

▲ **N. J., Mount Holly**—SHOPPING CENTER—Hollybrook Shopping Center, Inc., Holly and Eyrestown Rds., 22 story shopping center, on 25 acre tract on Rte. 38, Lumberton Twp., $2,000,000.

▲ **N. J., Princeton**—ATOMIC RESEARCH—Princeton University, Princeton, N. J., and University of Pennsylvania, Phila., Pa., plans by Voorhees, Walker Smith & Smith, 101 Park Ave., New York, N. Y., atomic research for AEC $5,000,000-$6,000,000, Gibbs & Hill, Inc., Penn. Station, New York, N. Y., consult. engr. CD 10/19.

▲ **N. Y., Hamburg** — SHOPPING PLAZA — Wells & Barker, 47 W. Huron St., Buffalo, shopping plaza built around Adam, Meldrum and Anderson Department Store branch, at Camp Rd. and Rte. 20. $3,000,000.

▲ **N. Y., New York**—APARTMENT—Fifth Avenue Cooperative Apartments, c/o H. Herbert Lilien & Clarence Lilien, archts., 201 W. 72 St., Zone 23, 14 story apartment, 202 units, 1270 Fifth Ave., at 108 St. $3,000,000. To go ahead in June, 1957.

▲ **O., Berea**—LIBRARY, etc.—Baldwin Wallace College, Berea, plans by Mellenbrook, Foley & Scott, 20 Beech St., library, CD 11/10/55; stadium, science bldg., commerce bldg., auditorium, modernizing, repairing Wheeler, Marting and Science Halls; Second phase, incl. music, student union, administration and speech-theatre-art bldgs. and health center. Over $4,000,000.

▲ **O., Brooklyn**—SHOPPING CENTER—Sunshine Realty Co., 17903 St. Clair Ave., Cleveland, Zone 10, plans by Weinberg & Teare, Citizens Bldg., Cleveland, Zone 14, 40-unit, 230,000 sq. ft., 1 story brick, concrete shopping center, Biddulph and Ridge Rds. $3,000,000.

▲ **Pa., Abington**—STORE—Sears Roebuck & Co., 4640 Roosevelt Blvd., Phila., 200,000 sq. ft. department store, Old York Rd., on 12 acre site, $2,000,000.

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CONTRACT T-1B

The work to be done under this Contract shall commence on May 1, 1957, or on such earlier date as may be mutually agreed upon between the Commission and the Contractor. All work under this Contract shall be completed on or before December 15, 1958, and consists of: The construction of bridge T1-9, including part of the approach embankments but exclusive of furnishing, fabricating and erecting structural steel, for approximately 0.3 miles of the Northern Illinois Toll Highway in Construction Section T-1B thereof, beginning at a point approximately 125 feet east of Ashland Avenue and extending westerly across Ashland Avenue, Markham Yards of the Illinois Central Railroad, South Park Ave., and Wood Blvd. to a point approximately 125 feet west of Wood Blvd., between centerline station 277+12 to centerline station 294+78.50 of the Tri-State Route in Thornton Twp., Cook Co., Ill.

The approximate quantities of the principal items of work are:

Borrow Excavation	135,000 Cu. Yd.
Structure Excavation	5,200 Cu. Yd.
Concrete Filled Metal Shell Piles	35,000 Lin. Ft.
Reinforced Concrete	11,000 Cu. Yd.
Reinforcing Steel	1,475,000 lbs.
Aluminum Handrail	7,200 Lin. Ft.

CONTRACT T-2A

The work to be done under this Contract shall commence on May 1, 1957, or on such earlier date as may be mutually agreed upon between the Commission and the Contractor. All work under this Contract shall be completed on or before December 15, 1958, and consists of: The grading, drainage, paving, the construction of appurtenances, and the erection of precast concrete and structural steel bridges for approximately 2.59 miles of the Tri-State Route of the Northern Illinois Toll Highway in construction section T-2A, beginning at a point about 467 feet east of the Chicago, Rock Island and Pacific Railroad at the Northern Illinois Toll Highway Centerline Station 551+27.92 in Bremen Township, Cook County, Illinois, and extending northerly to a point approximately 1117 feet northwest of 131st Street at Northern Illinois Toll Highway Centerline Station 688+00 in Worth Township, Cook County, Illinois.

The approximate quantities for the principal items of work are as follows:

Roadway Excavation	138,000 C.Y.
Borrow	1,650,000 C.Y.
Selected Subgrade	45,000 C.Y.
Granular Subbase	24,000 C.Y.
10" Reinforced PCC Pavement	72,000 S.Y.
3" Bituminous Concrete Shoulders	40,000 S.Y.
Structural Concrete	17,000 C.Y.
Reinforcing Steel	2,300,000 Lbs.
Structural Steel—Erection	840,000 Lbs.

CONTRACT T-5A

The work to be done under this Contract shall commence on May 1, 1957, or on such earlier date as may be mutually agreed upon between the Commission and the Contractor. All work under this Contract shall be completed on or before December 15, 1958, and consists of: The grading, drainage, paving, the construction of appurtenances, and the erection of precast concrete and steel bridges for approximately 5.40 miles of the Northern Illinois Toll Highway, including 0.71 miles of interchange connector, in Construction Section T-5A thereof, beginning at a point about 600 feet east of Wolf Road at Northern Illinois Toll Highway centerline Station 1399+41.87 in Lyons Township, Cook County, Illinois, and extending westerly and northerly to a point about 500 feet north of 31st Street at Northern Illinois Toll Highway Centerline Station 1684+33.71 in Proviso Township, Cook County, Illinois.

The approximate quantities of the principal items of work are as follows:

Special Excavation	400,000 C.Y.
Channel Excavation	565,000 C.Y.
Borrow	2,300,000 C.Y.
Selected Subgrade	150,000 C.Y.
Granular Subbase	75,000 C.Y.
10" Reinforced P.C.C. Pavement	320,000 S.Y.
3" Bituminous Concrete Shoulders	96,000 S.Y.
Curbs and Gutters	14,000 L.F.
Structure Concrete	23,900 C.Y.
Reinforcing Steel	3,000,000 Lbs.

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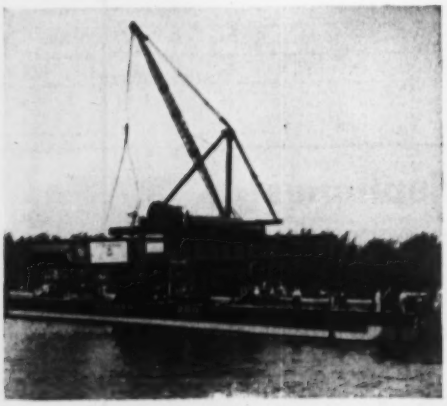

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▲ **Tex., Dallas**—DWELLINGS—Bon Aire Corp., c/o Charles E. Tobin & W. M. Burns, c/o 2520 Cedar Springs St., 700 dwellings, 200-acre site, $14,000,000; 1,115 dwellings, 316-acre site, $10,035,000; 60 dwellings, 25-acre site, $3,000,000; all part of 700-acre tract.

▲ **Tex., Houston**—DWELLINGS—Norm Bldg. Corp., c/o Earl Fuchs, Fairbanks-W. Montgomery Rd., 250 dwellings, Garden City Park, $2,350,000.

▲ **Tex., Houston**—SHOPPING CENTER—West Point Development Co., c/o J. S. Norman, 8400 Long Point Rd., shopping center, 14½-acre tract at Long Point and Witte Rds. $2,000,000.

▲ **Wash., Spokane**—SHOPPING CENTER—E. D. McCarthy & Assocs., W 1017 Riverside St., shopping center, University and Sprague Sts. $2,500,000. Bids in September.

▲ **Que., Montreal**—HOSPITAL WING—Hospital St. Jean de Dieu, Longue Pointe, plans by Brois & Savard, 7084 rue St. Deis, Montreal, mental hospital wing, Sherbrooke and Hochelaga Sts. $4,500,000.

INDUSTRIAL BUILDINGS

▲ **Conn., Stamford**—LABORATORY—American Machine & Foundry Co., 261 Madison Ave., New York, N. Y., plans by Perkins & Will, 309 W. Jackson St., Chicago, Ill., 1 story, brick, steel, central engineering laboratory. $4,000,000. Severud, Elstadt & Krueger, 415 Lexington Ave., New York, N. Y. consult. engrs. Jaros, Baum & Bolles, 415 Lexington Ave., New York, N. Y., engrs. CD 10/3.

▲ **Ind., East Chicago**—BLAST FURNACE—Youngstown Sheet & Tube Co., Stambaugh Bldg., Youngstown, O., blast furnace. $8,000,000.

▲ **Ky., Ashland**—FURNACE—Armco Steel Corp., Middletown, O., blast furnace with 50,000 tons per month capacity. $20,000,000.

▲ **Miss., Aberdeen**—PLANT—American Potash & Chemical Corp., W. Sixth and Westmoreland Sts., Los Angeles 24, Calif., sodium chlorate plant, near here. $5,000,000.

▲ **Mont., Laurel**—REFINERY, BOILER, etc.—Farmers Union Central Exchange, Inc., 1200 S. Concord St., St. Paul, Minn., furnish, install at refinery, new boiler, cooling tower, new unifiter and platformer equip., $3,000,000. Universal Oil Products Co., Inc., 310 S. Michigan Ave., Chicago, Ill., consult engrs. Constr. in 1957. CD 2/26.

▲ **N. J., Florham Park**—RESEARCH CENTER—Esso Research & Engineering Co., U. S. Hy. 1 and Park Ave. S., Linden, plans by Voorhees, Walker, Smith & Smith, 101 Park Ave., New York 17, N. Y., research center on 650 acre tract. $5,000,000. CD 2/19.

▲ **N. J., North Bergen**—WAREHOUSE, etc.—Lincoln Circle Building, Inc. c/o Federal Storage Warehouse, 155 Washington St., Newark, 250,000 sq. ft. warehouse and office, 83 St. $3,000,000-$4,000,000.

▲ **N. Y., Schenectady**—STEAM GENERATOR TURBINE—General Electric Co., River Rd., expanding steam generator turbine department, $8,000,000; gas turbine dept., $3,000,000; motor and generator dept., $4,700,000; motor and generator dept., $5,000,000. CD 4/6.

▲ **N. Y., Sterling Forest**—LABORATORY, etc.—Union Carbide Nuclear Co. & Union Carbide Ore Co., c/o Union Carbide & Carbon Corp., 30 E. 42 St., New York, Zone 17, plans by Osborn Co., archt.-engr., 57x138 ft. radioactive materials laboratory; 98x146 ft. brick, steel Ores and Engineering Bldg.; 2 story, 166x178 ft. research and administration bldg.; central power plant and utilities bldg.

▲ **O., Columbus**—PLANT—Western Electric Co., 195 Broadway, New York, N. Y., 1,000,000 sq. ft. plant to mfg. crossbar systems for telephone exchanges and 3 story administration bldg. and service bldg. $50,000,000.

▲ **Tex., Houston**—PLANT—American Can Co., Clinton and Lockwood Drives, plant expansion. $2,000,000.

▲ **Tex., Houston**—PLANT—Armco Steel Corp., 703 Curtis St., Middletown, O., steel melting facilities with 750,000 tons per year capacity. $30,000,000.

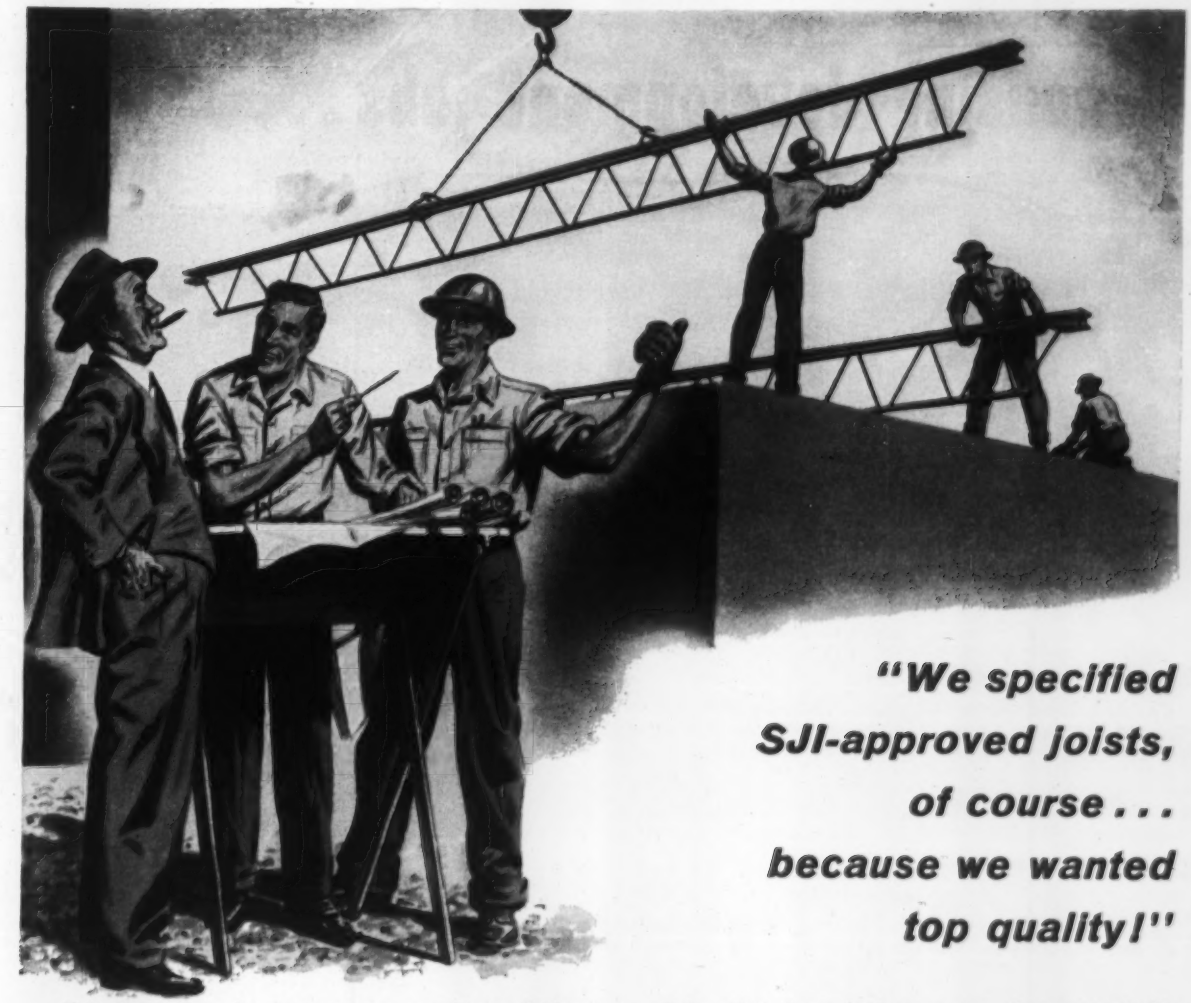
▲ **Tex., Houston**—PLANT—Armour & Co., Union Stock Yards, Chicago, Ill., meat packing plant and allied facilities in Cullen's 650-acre tract at Hardy St. Rd. and Rankin Rd. $3,000,000. CD 9/18.

▲ **Utah, Salt Lake City**—HEADQUARTERS—Pacific Northwest Pipeline Corp., M. & M. Bldg. Houston, Tex., plans by Slack W. & David Winburn, Beason Bldg., 8½ story, headquarters bldg., 3 St. East and 2 St. South, $2,500,000. Construction to start soon.

▲ **Man., Transcona**—PLANT—Griffin Steel Foundries Ltd., Brouillette St., P. O. Box 310, St. Hyacinthe, Que., plant $5,000,000.

UNCLASSIFIED

▲ **Tex., Houston**—DOCKS, etc.—Port Comn., Navigation Dist., 1519 Capitol St., 2 Docks or Wharves No. 18 and No. 19, $2,900,000, Rob. J. Cummins, c/o Bankers Mtg. Bldg., and Lockwood Andrews & Newman, 1010 Waugh St., consult. engrs.; Dock or Wharf No. 20, $1,000,000, Francis J. Niven & J. G. McKenzie, 3908 Main St., consult. engrs.; constr. port railway trackage and allied facilities in port areas, incl. development of railway yard, $1,750,000, Freese, Nichols & Turner, C&I Life Bldg., consult. engrs.; access roads, $200,000, Ryburn C. Shaner, 4019 River Dr., consult. engr.; transit sheds, $200,000, Rob. J. Cummins, Bkrs. Mtg. Bldg., and Lockwood, Andrews & Newman, 1010 Waugh St., consult. engrs. CD 2/7.



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the No. 955 Traxcavator* pays its way

From digging basements to building streets and grading lots, the new CAT* No. 955 Traxcavator is a bearcat for work, a money-maker for contractors.

The machine shown here is owned by R. & M. Construction Co., St. Louis, Mo. Working on an 83-home project in the Crestwood area of St. Louis, the No. 955 is in constant use, forming subgrade for streets, digging sidewalks, backfilling foundations, spreading and grading topsoil. Mr. Howard Skinker, Master Mechanic and Grade Foreman, says: "This new No. 955 is a big improvement in tractor shovels. The increased visibility and new bucket mechanism make it a much more valuable machine."

The No. 955 is one of three new Traxcavators in the Caterpillar line. Its bucket capacity is 1½ cu. yd. The No. 933 has a 1-cu.-yd. bucket; the No. 977, 2¼-cu.-yd. All three machines have balanced weight, traction and power to dig in hard material. They lift loads surely and quickly and are easy to maneuver. One-hand bucket operation and a comfortable seat set high for visibility give the operator a break. There's a long-lived, trouble-free oil clutch of proved superiority. The 40-degree bucket tilt back at ground level assures full loads at every pass.

If you're looking for the right unit to meet your excavating and loading needs, ask your Caterpillar Dealer for a demonstration right on your job. You can trust his trained service men and factory parts to keep your Cat equipment in top working order.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar, Cat and Traxcavator are Registered Trademarks

MODERN HEAVY-DUTY EXCAVATING EQUIPMENT

Bids—Low Bids—Contracts—Second Section

NEW ENGLAND

HEAVY CONSTRUCTION—BA

▲† **Vermont**—BA On Or About 4/16—U. S. Eng., 150 Causeway St., Boston 14, Mass., Ball Meuntain Dam and appurtenant structures, West River, CIVENG-19-016-57-73. Est. over $5,000,000. CD 8/10/56.

BUILDINGS—SLC

▲ **Mass., Worcester**—CENTRAL SERVICE—Norton Co., 1 New Bond St., soon lets contract central service bldg., New Bond and "C" Sts. $2,000,000. CD 2/26.

HEAVY CONSTRUCTION—LB & CA

▲† **Petricca Constr. Co.**, 205 Harrison St., Syracuse, N. Y. CA **$5,400,639**, est. $5,000,000. Unit No. 6, flood control, North Adams, CIVENG-30-075-57-12, MASSACHUSETTS. U. S. Eng., 111 E. 16 St., New York, N. Y. CD 1/2, under LB.

▲ **CONNECTICUT**—State Hy. Dpt., 165 Capitol Ave., Hartford,
Conn.—**Frouge Constr. Co. Inc.**, 141 North Ave., Bridgeport, Conn., CA **$2,957,304**. Proj. 305-07, service station, restaurant lunchrooms, etc. Conn. Turnpike, Darien;
Conn.—**Wexler Constr. Co., Inc.**, 118 Needham St., Newton Highlands, Mass., CA **$2,630,000**. Proj. 306-15, service station, restaurant, lunchroom, etc. Fairfield; LB **$2,540,500**. Proj. 309-07, service station, restaurant, lunchrooms, etc., Milford. Bids Feb. 14. Grand total $8,127,804. CD 2/18, under LB.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

March 21 New Jersey, New York

STREETS AND ROADS

March 21 New Jersey, New York

▲ **New York**—BA 4/9—Bd. Water Supply, 120 Wall St., New York, constr. easterly portion of West Delaware Tunnel of Delaware System, comprising about 19 mi. concrete lined pressure tunnel, circular in section and 11 ft. 4 in. in finished diam., and Shafts 5 to 7 inclusive, 14 ft. in diam., circular in section and lined with concrete; Contr. 454 60,000 lin. ft. tunnel, incl. Shaft 5 approx. 760 ft. deep, Shaft 6 approx. 780 ft. deep located in towns of Rockland and Neversink, Sullivan Co.; Contr. 455, 42,000 lin. ft. tunnel, incl. Shaft 7, approx. 650 ft. deep, tunnel outlet, located in town of Neversink, Sullivan Co. Plans deposit $5. CD 1/27/50.

▲† **N. Y., Rome**—HYDRANT FUELING SYSTEM—BA On Or About 4/16—U. S. Eng., 111 E. 16 St., New York, Zone 3, hydrant fueling sys., Griffiss Air Force Base, ENG-30-075-57-321. $1,500,000-$2,000,000. Plans deposit $15. CD 8/21.

BUILDINGS—BA

▲ **N. Y., Lackawanna**—SCHOOL—BA 3/28—Bd. Educ., constr. Senior High School. $3,200,000. Plans deposit $35, John Edgar, 33 Rosary Ave., Lackwanna, archt. CD 3/21/56.

HEAVY CONSTRUCTION—LB & CA

▲† **Sovereign Constr. Co. Ltd.**, 1181 Broadway, New York 1, N. Y. CA **$2,241,630**. airmen's dormitories and dining hall, Griffiss Air Force Base, ENG-30-075-57-290, ROME, N. Y. U. S. Eng., 111 E. 16 St., New York 3, N. Y. CD 2/25, under LB.

BUILDINGS—LB & CA

▲ **Old Town Hills Homes**, c/o Herman H. York, archt., 90-04 161 St., Jamaica, N. Y. Owner Builds. **$2,000,000**. 100 HOUSES on tract at Gnarled Hollow and Old Town Rds., EAST SETAUKET, N. Y.

▲ **Esmi-Lou Corp.**, Samuel Lemberg, pres., 400 Madison Ave., New York 6, N. Y. Separate Contracts. **$2,000,000**. DISTRIBUTING CENTER incl. 5 bldgs. for A & P, on 48 acre tract, ELMSFORD, N. Y. Saul Goldsmith, 80 Livingston St., Brooklyn 2, N. Y., archt.

▲ **Walter Kidde Constructors, Inc.**, 140 Cedar St., New York 6, N. Y. CA Est. **$2,000,000**. 100,000 sq. ft. WAREHOUSE and OFFICE for roasting and packaging coffee PALISADES PARK, N. J. S. A. Schonbrunn Co., Inc., 77 Water St., New York, N. Y. CD 8/30.

▲ **Diesel Constr. Co., Inc.**, 24 W. 58 St., New York 19, N. Y. Owner Builds. **$28,000,000**. 10 story, air-conditioned OFFICE on block bounded by Church and Barclay Sts., West Broadway and Park Place to be called 100 Church St., NEW YORK, N. Y. CD 2/28/56.

▲ **Rheinstein Constr. Co., Inc.**, 21 E. 40 St., New York 17, N. Y. CA (1st section) 13 story, 325x240 ft. newspaper PLANT, 41-115 West End Ave. from 62 to 65 Sts., NEW YORK, N. Y. The New York Times, 229 W. 43 St., New York 36, N. Y. CD 2/4.

▲† **Beacon Constr. Co., Inc.**, 102 Hano St., Boston, Mass. CA **$1,641,119**. SAC bldg. area, Griffiss Air Force Base, ENG-30-075-57-310, ROME, N. Y. U. S. Eng., 111 E. 16 St., New York 3, N. Y. CD 2/25, under LB.

▲ **William F. Sutter**, Nescopek, Pa. LB **$3,256,000**. general constr. SENIOR HIGH SCHOOL, BUTLER, PA. Butler Area Joint School, Butler, La. Bids Feb. 11. CD 1/31;
Harry Dougherty & Son, Beulah Lane, Pittsburgh, Pa. LB **$639,300**. heating and ventilating work; LB **$624,000**, plumbing work (Butler, Pa.).

SOUTH

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

STREETS AND ROADS

March 20, 27 Virginia

▲ **Fla., Homestead**—BA 4/30—Base Contracting Office, Homestead Air Force Base, Armed Services Housing, (1,570 units), vicinity of Homestead Air Force Base, IFB-08-621-57-59. $21,000,000. Norman M. Giller & Assocs., 1833 Bay Road, Miami Beach, engrs.-archts. CD 1/25/56.

HEAVY CONSTRUCTION—LB & CA

▲† **T. L. James & Co.**, Box 531, Ruston, La. CA **$8,775,600**. taxiway and aprons paving at Naval Auxiliary Air Station, NBy 6394, NEW IBERIA, LA. Officer in Charge of Constr., Eighth Naval Dist., Bldg. 16, U. S. Naval Station, New Orleans (Algiers), La. CD 2/26, under LB.

▲† **W. L. Hailey & Co., Inc.**, 314 42 Ave. N., Nashville, Tenn. CA **$2,116,251**. local protection proj., Cattlettsburg, Section 2 and pump stations, Contr. DA-46-022-CIVENG 57-70, IFB CIVENG 46-022-57-31, KENTUCKY. U. S. Eng., 247 Fourth St., Huntington, W. Va. CD 2/20, under LB.

BUILDINGS—LB & CA

▲ **Jones-Mahoney Corp.**, P.O. Box 1908, Tampa, Fla., CA **$1,887,500**, MEN'S DORMITORY, University of Florida, GAINESVILLE, FLA. State Bd. Control, University of Florida, Administration Bldg., Gainesville, Fla. CD 2/13, under LB.

▲ **Koppers Co. Inc.**, Koppers Bldg., Pittsburgh 19, Pa., CA design and construct 60 COKE OVENS, BIRMINGHAM, ALA. United States Pipe & Foundry Co., 3300 1 Ave. N. Birmingham, Ala.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

March 20 Michigan

STREETS AND ROADS

March 20 Michigan

▲ **ILLINOIS**—BA 3/28—Illinois State Toll Hy. Comn., 30 N. Wacker Dr., Chicago.
Contr. T-11-B, grading, drainage, paving appurtenances, constr. precast concrete and structural steel bridges, beginning W. of Huehl Rd. extending easterly to point 239 ft. N. of Dundee Rd. 4.519 mi. $4,000,000. Homer L. Castain & Assocs. Decatur, Ill., section engrs. CD 5/11.

▲ **ILLINOIS**—BA 3/28—Illinois State Toll Hy. Comn., 20 N. Wacker Dr., Chicago,
Contr. ST-2, fabricating, erecting structural steel for superstructure beginning N. of town of Robbins and crossing Calumet Sag Channel to point 350 ft. of Village of Alsip 2,712,000 lb. structural steel and girder spans. $3,000,000. Joseph K. Knoerle & J. Assocs. 1551 N. Wacker Dr., Chicago, section engrs. CD 5/11, under Streets and Roads.

HEAVY CONSTRUCTION—LB & CA

▲ **Shook Constr. Co.**, 582 W. 2 St., Dayton, O. LB **$3,048,325**. (9 bidders.) sewage treatment plant, HAMILTON, O. City, City Hall, Hamilton, O. Bids Feb. 28. CD 1/18.

▲ **ILLINOIS**—Illinois Toll Highway Comn., 20 N. Wacker Dr., Chicago,
ITHC—**Allied Structural Steel Comn.**, 20 N. Wacker Dr., Chicago, Ill., LB **$1,769,235**, Contract ST-1, furnishing, fabricating, shop painting, erecting approx. 6,330,000 lb. girder spans, across Ashland, South Park and Wood Aves. in addnl. to rail yards on Tri-State Route;
ITHC—**Bethlehem Steel Co.**, Prudential Plaza, Chicago, Ill., LB **$5,707,850**. Contract SNI-4, furnishing, fabricating, shop painting, del. approx. 22,557,000 lb. girder and beam spans for 21 bridges on Tri-State Tollway; LB **$1,166,923**, Contract SNI-5, furnishing, fabricating, shop painting, del. 4,388,000 lb. girder and beam spans for 5 structures, 3 of which are on Tri-State Tollway and 2 on East-West Tollway. Bids Feb. 28. CD 2/7.

▲ **Gust K. Newberg Constr. Co.**, 2040 N. Ashland Ave., Chicago, Ill., CA **$9,867,000**. Central District Filtration Plant, within cofferdam, N. of Navy Pier and East Lake Shore Dr., CHICAGO, ILL. City, City Hall, Chicago, Ill. Bids Jan. 17. CD 2/5, under LB.

BUILDINGS—LB & CA

▲ **Biltmore Building Co.**, 17615 James Couzens Hy., Detroit, Mich. Owner Builds. **$12,000,000**. 900 to 1,000 HOUSES Cherry Hill Rd., Blen and Merriman Sts., NANKIN, MICH.

WEST OF MISSISSIPPI

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

March 19 Kansas March 22 Minnesota, North Dakota

STREETS AND ROADS

March 19 Kansas March 22 Minnesota, North Dakota

BUILDINGS—BA

▲ **Tex., Victoria**—HOUSING—BA On Or About 4/26—Base Procurement Office, Base Theatre (Bldg. 128), Foster Air Force Base, construct and finance 500-family housing units, Foster Air Force Base, Bid N. 41-656-57-60. $5,750,000. CD 2/15.

HEAVY CONSTRUCTION—LB & CA

▲† **H. B. Zachry Co.**, P. O. Box 10188, San Antonio, Tex., CA **$9,105,943**. runway taxiway paving and refueling sys., Bergstrom Air Force Base, ENG-41-443-57-25, AUSTIN, TEX. U. S. Eng., Box 1600, Fort Worth, Tex. Bids Feb. 26, awarded Feb. 27. CD 2/28, under LB.

▲† **McCormack Constr. Co.**, Pendleton, Ore. CA **$2,220,293**, est. $2,255,625. transmitter and receiver bldg., two dormitories, structures, Air Force Radar Base, northeast of here, LEWISTON, MONT. U. S. Eng., 4735 E. Marginal Way, Seattle 4, Wash. Bids Feb. 26, awarded Mar. 1. CD 3/1, under LB.

BUILDINGS—LB & CA

▲† **Sharp Bros. Constr. Co.**, 1014 E. 19 St., Kansas City, Mo. CA **$1,999,855**, est. $2,038,335. light MANUFACTURING BLDG. and support facility, for Bendix Aviation Corp., 95 and Troost Sts., KANSAS CITY, MO. Atomic Energy Comn., P. O. Box 5400, Albuquerque, N. M. Bids Feb. 21, awarded Mar. 1. CD 2/27, under LB.

▲† **Oahe Constructors** (Foley, Winston-Donovan-Missouri Valley-Lytle), 900 New York Bldg., St. Paul., Minn., CA **$1,872,000**. Stage V, outlet works, control superstructure, Oahe Reservoir Proj., near Pierre, Inv. 25-066-57-61, SOUTH DAKOTA, U. S. Eng., 1709 Jackson St., Omaha, Neb. Bids Feb. 14. CD 2/20, under LB.

▲ **T. C. Bateson Constr. Co.**, 6800 Denton Dr., Dallas, Tex. LB **$3,063,800**. construct and finance 300 HOUSING units (Capehart), ENG-21-028-57-55. FORT LEAVENWORTH, KAN. U. S. Eng., 1800 Federal Office Bldg., Kansas City, Mo. Bids Mar. 1. CD 2/13.

▲ **G. E. Bass & Co.**, 2715 N. State St., Jackson, Miss., CA **$3,322,033**. 200-bed Baptist GENERAL HOSPITAL, OKLAHOMA CITY, OKLA. Oklahoma Baptist General Convention, 1141 N. Robinson St., Oklahoma City, Okla. Bids Feb. 14, CD 2/19, under LB.

▲ **J. W. Bateson Co., Inc.**, 13307 Walnut Hill Station, Dallas, Tex., CA Total est. **$19,000,000**. general contract Southland Buildings incl. (1) 225,000 sq. ft. underground garage (2) 175,000 sq. ft. retail and shops (3) 400,000 sq. ft. office bldg. (4) 42 story OFFICE; (5) 28 story 600-room hotel, DALLAS, TEX. Southland Life Insurance Co., Southland Life Bldg., Dallas, Tex. Bids Jan. 9. CD 12/20;
Farwall Co., 300 South Bunker Blvd., Dallas and **Sam P. Wallace Co.**, Tower Petroleum Bldg., Dallas, Tex., CA mechanical contract for Southland Buildings (Dallas, Tex.);
Fischbach & Moore, Inc., 1717 Baylor St., Dallas, Tex., CA electrical contract for Southland Buildings (Dallas, Tex.).

FAR WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

April 2, 3, 4 California

▲ **Calif., Los Angeles**—BA 3/22—Metropolitan Water Dist., 306 W. 3 St., Pump Delivery Line No. 3, Spec. 519, steel plate pump delivery pipe line at 5 pumping plants, 6 and 10 ft. in diam., San Bernardino and Riverside Counties. $2,000,000. Plans deposit $5.

▲† **California**—BA 4/4—U. S. Eng., 751 S. Figueroa St., Los Angeles, levees downstream from Crestmore Ave. Bridge near Riverside, Santa Ana River Basin, CIVENG-04-353-57-37. $2,000,000. CD 4/21/44.

BUILDINGS—BA

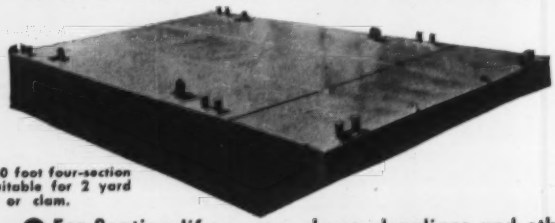
▲ **Wash., Tacoma**—SCHOOL—BA 3/26—School Dist. No. 10, S. 8 and Tacoma Sts., 15 rein.-con. 188,000 sq. ft. buildings for Woodrow Wilson Senior High School. $3,000,000. Plans deposit $100 for general. Lea, Pearson & Richards, 240 Stadium Way, archts. CD 9/17/53.

▲ **Calif., Santa Barbara**—ARTS—BA 4/2—University of California, Santa Barbara College, Santa Barbara, arts bldg., Santa Barbara Campus. $2,083,336. Plans deposit $300. Office of Architect & Engineers, UCLA, 405 S. Hilgard St., Los Angeles, archts. CD 4/25.

HEAVY CONSTRUCTION—LB & CA

▲† **Gibbons & Reed Co.**, 825 W. 9 St. N., Salt Lake City, Utah, CA **$2,518,315**. Sch. B, reconstr. and exten. runway and exten. alert taxiway, Geiger Air Force Base, Inv. 57-101, SPOKANE, WASH. U. S. Eng., 4753 E. Marginal Way, Seattle 4, Wash. Bids Feb. 21. CD 2/27, under LB.

MANITOWOC
SECTIONAL BARGES



A 50 x 30 foot four-section barge suitable for 2 yard dragline or clam.

● For floating life cranes, clams, draglines and other contrators' equipment. Easily assembled or knocked down for transporting by rail or highway.

Loading a 40-foot section for highway transportation.

Length of sections from 20 to 50 feet in 10-foot increments.

Spuds, deck fittings, loading ramps and other accessories available.

MANITOWOC SHIPBUILDING, INC.

MANITOWOC, WISCONSIN

Write for information and prices.

Sold direct or through Manitowoc Engineering Corp. distributors.

Just the ticket for quick, easy brush-cutting

Light-weight, powerful, versatile . . . that's the McCulloch Model 35 brushcutter. In just a few minutes, this work-saving tool can be changed over to a chain saw and back again. Or, bought as an attachment, the brushcutter can be used on the McCulloch 33, Super 33 and 39 model chain saws.

CHECK THESE IMPORTANT FEATURES:

- Cuts with ease through light brush or saplings up to 6 inches.
- Weighs less than 28 pounds with engine and shoulder harness.
- Blade angle allows you to cut flush with ground.
- Exclusive bucking spike provides added safety, better leverage in cutting large saplings.
- Comfortable handlebars give you complete control at all times, better maneuverability in close quarters.
- Hollow steel drive shaft plus famous McCulloch engine assures longer life and dependability of brushcutter.
- *See your nearest McCulloch dealer for a demonstration.*

McCULLOCH

World's largest chain saw builder

McCulloch Motors Corporation
Los Angeles 45, California

0-61035

▲ **General Electric Co.**, River Rd., Schenectady, N. Y., CA supplying buswork and switchgear for first major underground power plant, Haas Power Plant on Kings River, CALIFORNIA. Pacific Gas & Electric Co., 245 Market St., San Francisco 6, Calif. CD 10/16, under CA.

▲ **CALIFORNIA**—State Div., Hys., 1120 N. St., Sacramento,
Gibbons Reed Co., 825 West Ninth North St., Salt Lake City, Utah, LB **$4,976,184**, est. $1,167,000. (8 bidders) grading, paving 5.4 mi. 4 lane freeway on new and existing alignment on US 40 between 0.5 mi. east of Floriston and Nevada State Line and constr. undercrossing at Farad, Nevada and Sierra Counties. CD 2/1.

▲ **J. C. Boespflug Constr. Co.**, 605 S. Lucas Ave., Los Angeles, Calif. LB **$3,483,939.** (9 bidders) Lakewood Blvd. and Spring St. underpass at Long Beach Municipal Airport, LONG BEACH, CALIF. City, City Hall Long Beach, Calif. Bids Mar. 1. CD 2/8.

BUILDINGS—LB & CA

▲ **C. C. Moore Co.**, 450 Mission St., San Francisco, Calif., CA est. **$5,000,000** general contract STEAM PLANT, CROCKETT, CALIF. The California & Hawaiian Sugar Refining Co., 215 Market St., San Francisco, Calif. CD 3/26/56.

▲ **Haas & Haynie Constr. Co.**, 275 Pine St., San Francisco, Calif., CA **$10,000,000** (5 bidders) 22 story, 230,000 sq. ft. OFFICE BLDG., SAN FRANCISCO, CALIF. Crown-Zellerbach Corp., 343 Sansome St., San Francisco, Calif. Bids Mar. 1. CD 1/9.

▲ **James I. Barnes Constr. Co.**, 940 Spring St., Redwood City, Calif., LB **$1,852,000**, Proposal a 4 story, rein.-con. wing HOSPITAL addn., SAN JOSE, CALIF. San Jose Community Hospital, San Jose, Calif. Bids Mar. 1. CD 2/8.

CANADA

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
STREETS AND ROADS
March 20 Ontario

▲ Ont. Toronto—FEDERAL—BA 3/27—Dpt. P. Wks., Hunter Bldg., Ottawa, Ont., exterior wall cladding for 14-story federal bldg. with 300 ft. frontage, Adelaide St. E. and Victoria St. Est. $2,000,000 Total est. $14,000,000. Shore & Moffat, 51 Wellington St. W., archts. CD 12/13.

BUILDINGS—LB & CA

▲ **Richard & B. A. Ryan Ltd.**, 1705 William St., Montreal, Que., CA About **$3,000,000.** 70 HOUSES, SCHOOL, 19,000 to 20,000 ft. sewers, water mains, POST OFFICE BLDG., BUNKHOUSES and MISC. BLDGS., SCHEFFERVILLE, QUE. Iron Ore Co. of Canada Ltd., 810 Cote de Liesse Rd., Montreal, Que. Awarded Feb. 21.

ALASKA

HEAVY CONSTRUCTION—LB & CA

▲† **Reed & Martin, Inc.**, Box 568, Fairbanks, Alaska, CA **$2,219,561.** ammo storage facilities, Inv. 57-37, Ladd Air Force Base, ALASKA. U. S. Eng., 4735 E. Marginal Way, Seattle 4, Wash. Bids Feb. 26. CD 3/1, under LB.

▲† **S. S. Mullen, Inc.**, 621 9 Ave. N., Seattle, Wash., CA **$4,010,000**, est. $4,461,554 (5 bidders) DEW Line installations, Inv. 57-59 at Port Miller, ALASKA. U. S. Eng., Anchorage, Alaska. Bids Mar. 1. CD 2/7;
Chris Berg, Inc., 2730 Westlake Ave. N., Seattle, Wash., CA **$3,548,190**, est. $3,574,490, DEW Line Stations at Port Heiden (Alaska).

LATIN AMERICA

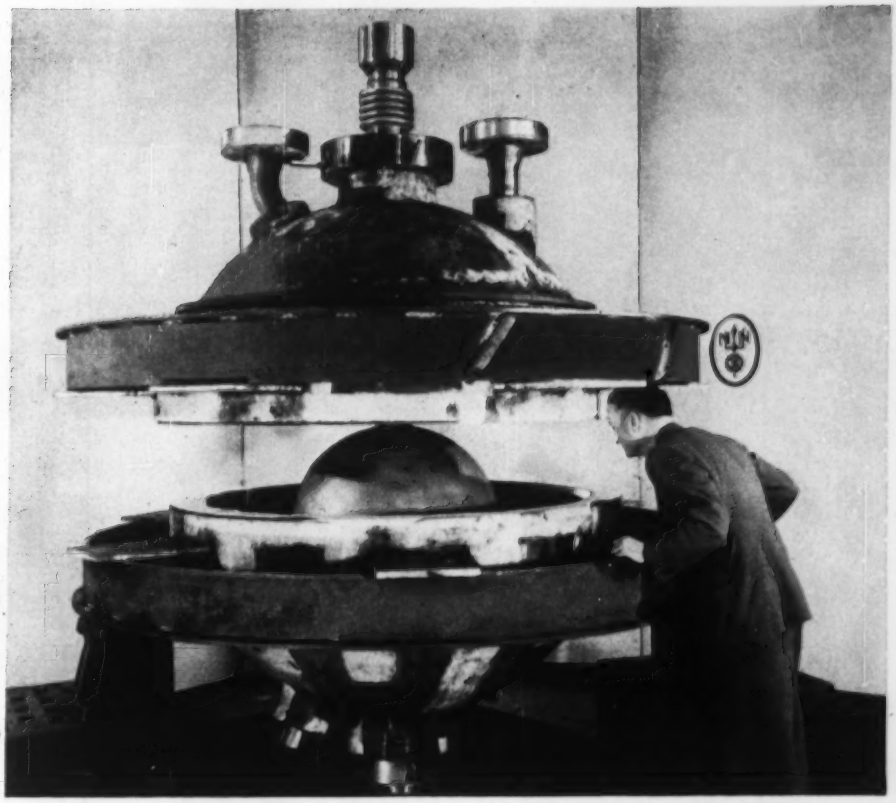
HEAVY CONSTRUCTION—LB & CA

▲ **Kaiser Engineers Div. of Henry J. Kaiser Co.**, 1924 Broadway, Oakland 12, Calif., U. S. A., **Raymond Concrete Pile Co.**, 40 Cedar St., New York, N. Y., U. S. A., **Morrison-Knudsen Inc.**, 319 Broadway, Boise, Idaho, U. S. A. and **Utah Constr. Co.**, 100 Bush St., San Francisco 4, Calif., U. S. A. Total est. CA **$30,000,000.** Tres Marias Dam on Sao Francisco River, BRAZIL, Centrais Electricas Minas Gerais, Rio de Janeiro, Brazil. CD 1/10.

▲ **VENEZUELA**—Minesterior de Obras Publicas, Direccion de Administracion, Centro Simon Bolivar, Torre Sur, Caracas,
Constructora Venezolana Opublind, C.A., Centro Profesional del Este, Sabana Grande, Caracas, D. F., Venezuela, LB **$3,813,791.** 4.2 mi. section incl. cloverleaf of Caracas-Valencia superhighway between Guayas and Tejerias in Aragua state. Bids Feb. 18. CD 2/21.

▲ **VENEZUELA**—Minesterior de Obras Publicas, Direcion de Carreteras, Centro Simon Bolivar, Torre Sur, Caracas, D.F., Venezuela,
Constructora Acero, S.A., Edificio Polar, Piso 12, Plaza Venezuela, Caracas, D.F., Venezuela, and **Ingerieros Venezolanso, C.A.**, Centro Profesional del Este, Piso 8, Sabana Grande, Caracas, D.F., Venezuela, CA **$6,757,937.** 6.8 mi. section of Caracas-Valencia Superhighway between kilometers 15 and 26. Bids Feb. 4. CD 2/21, under LB.

(Proposal Advertisement see pp. 117 to 119)



Assembly of zircaloy-2 core tank and pressure vessel for Homogeneous Reactor Experiment No. 2 (HRE-2). The HRE-2 is a 5,000 KW plant designed for AEC by Union Carbide Nuclear Company. Newport News manufactured the 32" I.D. core vessel from 5/16" zircaloy-2, which involved the development of new welding techniques. The pressure vessel of Type 347 stainless clad steel is 4.4" thick, with an inner diameter of 60". Newport News designed the expansion joint between inner and outer vessels, and also produced the unusual coil-cooled blast shield for the unit.

Zircaloy-2 vessel produced by Newport News...for first two-region breeding homogeneous reactor

Never before had a pressure vessel been constructed from zircaloy-2.

Extremely active chemically, particularly at elevated temperatures, this alloy challenged fabrication. Unshielded, heated zircaloy absorbs atmospheric gases in quantities that render its corrosion and physical properties unsatisfactory. Newport News, however, achieved consistent, satisfactory welds by use of inert gas and novel, plant-developed shielding.

The core tank contains the fuel region where fissioning produces heat. The blanket or reflector region around the tank is confined by a pressure vessel of stainless clad steel.

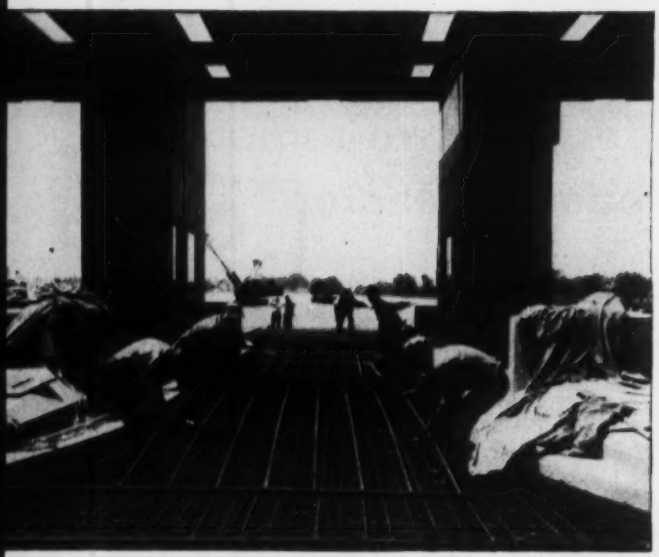
Newport News, working with its suppliers, developed special fabrication and welding techniques, as well as forge and rolling methods to produce plates and forgings with required corrosion, nuclear and physical properties for both vessels.

Make Newport News your source for fabricated metal structures. See how this company's high integration of skill and facilities can help you. Our illustrated booklet, *"Facilities and Products"*, is yours for the asking. Write for your copy now.

Newport News Shipbuilding and Dry Dock Company
Newport News, Virginia

New Indiana Toll Road made "super-safe"

with Snow-Melting System of National Pipe



Entrance and exit lanes of the Indiana Toll Road plaza areas are being equipped with snow-melting systems to help make this new East-West highway the safest in the world. Aimed at eliminating up to 90% of winter traffic hazards due to stopping and starting, the melting systems will be thermostatically controlled as needed.

Boilers, located beside the toll plazas, will heat the heat-transfer medium which will be circulated through a network of steel pipe coils to keep surface temperatures above freezing. National Tube is supplying all the pipe, more than 157,000 feet, for the snow-melting systems at the 12 plazas. Over 104,000 feet of ¾-inch pipe is used in the snow-melting grids, and 53,000 feet of pipe up to 12-inch for other required tie-in lines.

Due to its natural characteristics—smooth, uniform bending, permanent weldability, and long service life—National has become the world's largest selling pipe. It's tops in plumbing and heating systems, too. Architects, engineers and contractors have been specifying National Steel Pipe for over 60 years. They identify it with quality, dependability. They order it with confidence. When planning your next installation, remember National.

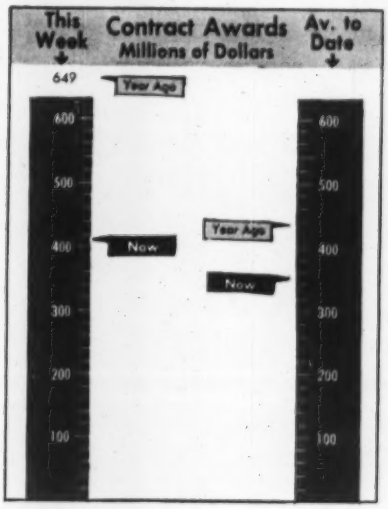
NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS **NATIONAL PIPE**

UNITED STATES STEEL

Construction Scoreboard

Activity this Week



AMOUNT OF CONTRACTS LET

By Ownership	This Week	Cum. 11 wks 1957	Chge %
	millions		
Federal	$73.0	$448.5	+10
State and Municipal	150.0	1,439.0	+13
Total Public	223.0	1,887.5	+12
Total Private	189.3	1,944.9	−37
U. S. Total	$412.3	$3,832.4	−20
By Type of Work			
Waterworks	$18.1	$76.1	+41
Sewerage	7.3	82.5	−48
Bridges	17.2	132.0	+18
Highways	54.9	591.7	+33
Earthwork, Waterways	26.5	237.9	+69
Buildings:			
Public, Excl. Housg.	35.0	453.9	+9
Public Housing	5.8	50.2	−49
Private Housing	60.0	654.1	−54
Commercial	82.8	359.6	−24
Industrial	40.1	774.9	−29
Unclassified	64.6	419.5	+9
U. S. Total	$412.3	$3,832.4	−20

NOTE: Minimum size projects included are: Waterworks and waterways, $44 000; other public works, $73,000; industrial buildings, $93,000; other buildings, $344,000.

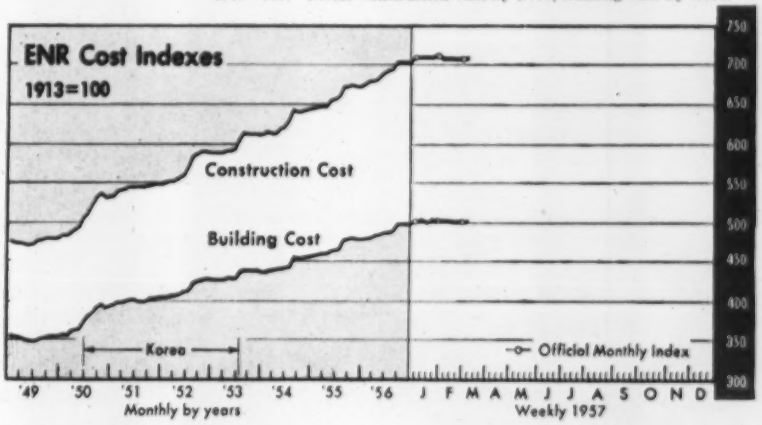
NEW CAPITAL FOR CONSTRUCTION

	Week of Mar. 7	Cum. 10 wks 1957	Chge '56-'57 %
	millions		
Corporate Securities	$158.7	$1,202.6	+159
State and Municipal:			
All Except Housing	121.2	1,032.4	+11
Housing	17.5	41.5	+104
Federal Loans	1.5	20.5	+12
Federal Aid	...	....	...
Total Nonfederal	$298.9	$2,297.0	+60
Federal Appropriations:			
In U. S.	...	.....	−100
Outside U. S.	...	....	...
Total New Capital	$298.9	$2,297.0	+57

Cost Indexes as of Now

ENR INDEXES (1913 = 100), 20-cities' average	Week of Mar. 7 1957	% Change from Feb. 7 1957	% Change from Mar. 8 1956
Construction Cost	709.64	+0.1	+4.2
Building Cost	501.51	−0.04	+3.7

To convert above indexes to 1926 = 100: Divide Construction Cost by 2.080; Building Cost by 1.850.
1949 = 100: Divide Construction Cost by 4.770; Building Cost by 3.518.



CONTRACTS AWARDED

	1957 February (millions)	1957 2-Mos. (millions)	% Change from 1956 Feb.	% Change from 1956 2-Mos.‡
Total U. S., ENR reported	$1,436.0	$3,099.8	−19	−18
Private	824.7	1,597.7	−34	−33
Public	611.3	1,502.0	+14	+ 6
State and Municipal	473.9	1,141.3	+14	+41
Federal	137.4	360.7	+12	+ 1
ENR Volume Index, 1913 = 100	546	525	−26	−24

NEW CONSTRUCTION CAPITAL

Total U. S.	$971.8	$1,998.1	+60	−13
State and Municipal Bond Sales	490.1	935.2	+28	−32
Corporate Security Sales	475.8	1,043.9	+120	+27
Federal Loans, Aid (nonfederal work)	5.9	19.0	− 6	−63
Federal Appropriations (federal work)	0	0	0	0

‡Based on average week

MATERIALS SHIPMENTS

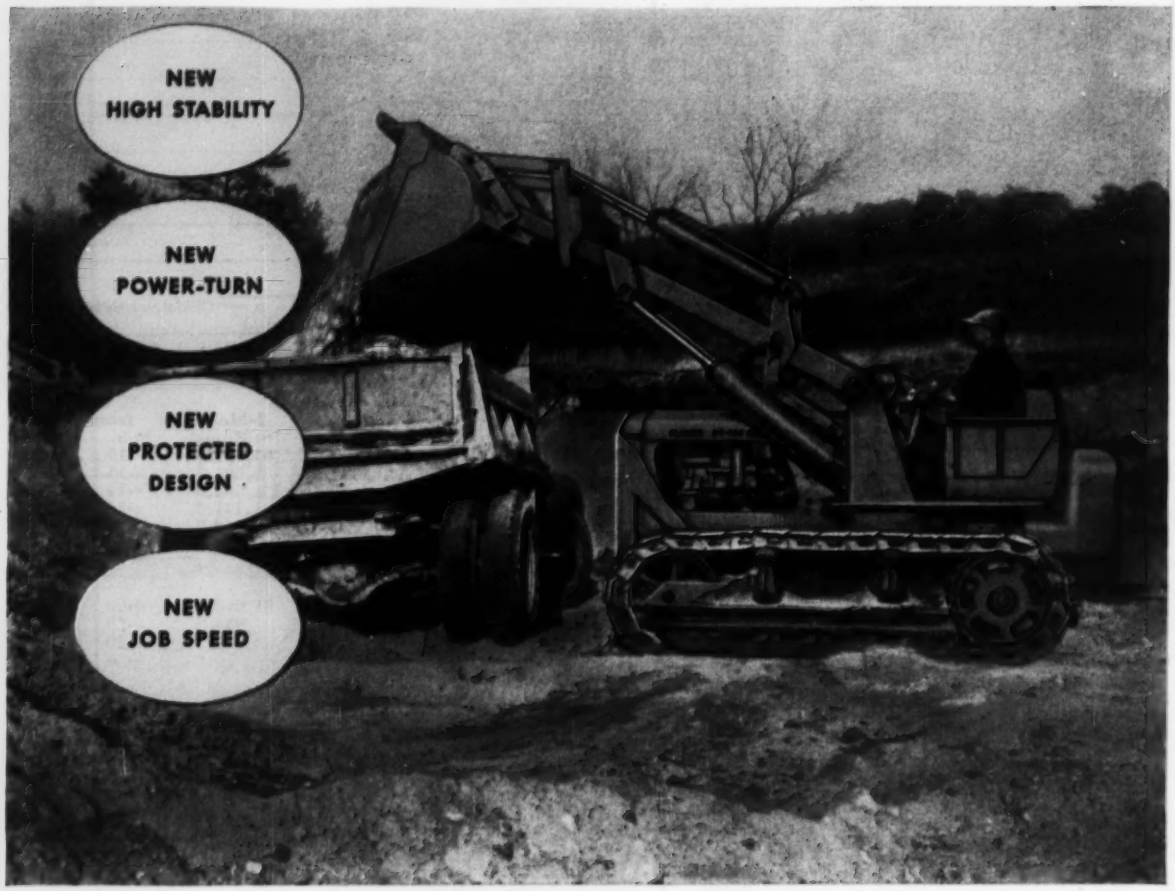
	Unit	1956-57 Nov. (N) Dec. (D) Jan. (J)	Cum. (No. of Mos.)	Percent Change from Year Ago Mo.	Cum.
Portland Cement, Bur Mines	thous bbls	22,705(N)	290,945(11)	+ 5	+ 6
Conc Paving Awards, PCA	thous sq yd	7,163(J)	7,163(1)	+ 4	+ 4
Fabricated Structural Steel	thous tons	262(J)	262(1)	+ 4	+ 4
Bookings, AISC	thous tons	298(J)	298(1)	−27	−27
Reinforcing Bars, Net, AISI	thous tons	240(D)	2,518(12)	+24	+16
Lumber, NLMA	mil fbm	2,390(D)	36,355(12)	−14	− 8
Orders	mil fbm	2,490(D)	36,126(12)	−16	− 9
Production	mil fbm	2,554(D)	37,503(12)	−12	− 4
Douglas Fir Plywood, DFPA, 3/8" basis					
Production (average per week)	mil sq ft	94.6(J)	94.6(1)	− 7	− 7
Orders (average per week)	mil sq ft	89.6(J)	89.6(1)	− 6	− 6
Clay Products, Bureau of Census					
Brick, Unglazed, Common, Face	mil bri	516.9(N)	6,298.8(11)	−11	− 4
Vitrified Clay Sewer Pipe	thous tons	143.1(N)	1,748.4(11)	− 9	−0.5
Structural Tile, Unglazed	thous tons	52.0(N)	628.0(11)	−19	−19
Asphalt Products, Bureau of Census					
Asphalt Roofing	thous sales sqs	2,227(D)	59,265(12)	−25	−0.5
Asphalt Siding	thous sales sqs	68(D)	1,236(12)	−13	− 4
Aluminum, Wrought, Net, Bur Census					
Sheet and Plate (non-heat treatable)	mil lbs	62.8(D)	1,050.6(12)	−33	+0.1
Wire and Cable	mil lbs	21.0(D)	303.0(12)	+ 1	+ 17
Extruded Shapes (soft alloys)	mil lbs	43.6(D)	639.7(12)	−18	+ 1

EMPLOYMENT AND FAILURES

Contract Const Employment, BLS	thous	2,754(J)	2,754(1)	+ 6	+ 6
Contractor Failures, Dun & Bradstreet					
Number		177(J)	177(1)	+40	+40
Liabilities	thous	$10,672(J)	$10,672(1)	+73	+73

NEW OLIVER OC-126 LOADER–1½ Yd.

Loaded with work advantages!



At last! Loader design comes *down to earth*—with the low silhouette mounting of this new Oliver OC-126. No more vision-blocking, high side pedestals this way... no more "rocking horse loading" action.

With the fulcrum point down, performance steps way up. Clean, clear-view design permits operator to work faster and safer. Low center of gravity means quicker and fuller loading... higher lifts and non-spill dumping. There's greater bucket roll-back *and* rotation. It all adds up to more yardage on any job... more profits.

The Oliver OC-126 is designed specifically as a complete loader unit. Special, rigidly mounted heavy frame has extra strength factor for loader service.

It's complete with Oliver POWER-TURN—the only crawler-loader with two-track power at *all* times, even on turns. It's sharper turning, more maneuverable.

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Tight Credit to Last Throughout 1957

Prime risks in industrial field will get funds needed; cost of borrowing to hold near present levels

Blue chip industrial firms won't have any trouble getting all the money they need this year to finance plant and equipment programs, but other prospective borrowers won't fare as well.

That's the prediction of George W. Warnecke, president of an integrated firm that does a $200 million a year business, handling everything from feasibility studies, to design, construction and financing. (The firm represents more than 30 institutional investors, including nine large insurance companies.)

In an interview with ENR last week, Warnecke also commented that:

- Interest rates will remain at present levels for the next year, for corporate borrowers in the prime risk category. Others will have to pay even higher rates than at present.
- Capital expenditures will continue strong through 1957 and well into 1958.
- Except for a handful of overstocked industries, no big inventory reductions are in sight. (Inventory loans are important in the short-term market.)
- Consumer spending and the ratio of savings to gross income both are expected to stay at present levels for the next year.

While Warnecke is counting heavily on the industrial building boom, he is less optimistic about some other types of private construction, notably office buildings, stores, hotels and mass housing.

Office building construction will slow down in some areas, including New York City, Warnecke feels, because high construction costs compel rental rates that eliminate large groups of prospective tenants. This is particularly true where the postwar wave of new office building construction already is creating vacancy problems in so-called fringe areas.

Luxury or semi-luxury apartment buildings (renting for $900 to $1,200 per room per year) offer a market for builders in such cities as New York, Chicago, Kansas City and San Francisco, according to Warnecke. But, he feels the demand-supply situation for lower-priced apartments is nearly in balance.

Demand is tapering off for small, neighborhood shopping centers, although builders still have some opportunities for the large, regional centers, according to Warnecke.

Will another hotel boom develop? Not in the foreseeable future, Warnecke says. "Any hotel of consequence would cost from $18,000 to $22,000 a room today, furnished," Warnecke said. "To amortize such costs, it is necessary to post room rates that are virtually prohibitive."

And, Warnecke ruled out chances of any significant upturn in mass housing as long as down payments remain at the present levels. He noted a significant swing from government insured mortgages to conventional financing.

Massive Office Building Started

In the shadow of the Woolworth Building, once the world's tallest structure, demolition of existing buildings and excavation are now under way for a 20 story, $28 million air-conditioned office building (arrow) with nearly 1 million sq ft of floor area.

The new building will occupy a square block, with an area of 54,000 sq ft, at 100 Church St., in New York's downtown financial district. As planned by Emery Roth & Sons, with James Ruderman as consulting engineer, it has been designed to attract organizations with a need for large areas on one level.

The first six floors, providing 218,000 sq ft, have been leased for ten years to the State of New York for the Workmen's Compensation Board. These floors will be served by a separate lobby, elevator and stairs.

The building's facade will be glass and vertical metal mullions up to the 15th floor setback. In the tower section, the glass spandrels will be replaced by blue, ceramic-glazed brick. The frame will be structural steel.

The project is being financed by Erwin S. Wolfson, chairman of Diesel Construction Co., the general contractor for the structure, and L. A. Wien and H. B. Helmsley—all of New York.

(B&F continued on page 110)

Construction Markets

Chicago: An On-the-Spot Report

"Construction in the Chicagoland area this year will top the record-breaking 1956 totals. Increased activity in public works, especially highways, and in industrial construction will more than offset, dollarwise, a possible modest decline in residential construction."

That's the way industry leaders and civic officials size up Chicago's construction markets for 1957. In dollars, materials and manpower, it adds up to a busy year ahead.

All of the various agencies engaged in this work in the metropolitan Chicago area have such ambitious programs that their total demands may create shortages in materials, manpower, machinery and possibly contractors to do the work. For example, only one bid was submitted at a recent letting for a million-dollar roadbuilding contract.

Biggest single construction venture, is the 193 mile system of tollroads (now abuilding) to encircle Chicago on three sides, extend west to Peoria and northwest to Rockford and the Wisconsin border.

At least $100 million worth of additional construction contracts will be awarded for the $415 million project, by June of this year.

Manpower requirements to keep this construction giant rolling will reach a peak of 15,000 by this June, says Charles L. Dearing, Executive Director of the Illinois Toll Highway Commission.

Chicago's Department of Public Works will spend about $10 million for right-of-way and $33 million for construction of its expressway system. In addition, about $12 million worth of construction contracts will be awarded on the 7.6 mile, $88 million Calumet Skyway Toll Bridge Project, to help speed Indiana tollroad traffic to downtown areas.

Expressways and tollways aren't the only facilities that require sizable contributions of materials, money and manpower. The 1957 construction program of Chicago's Department of Public Works, will include 60 miles of street widening and resurfacing at a cost of $5 million; about $12 million worth of new street lighting and $6 million worth of parking lots and ramp-type parking decks, according to Commissioner George L. De Ment.

Cook County's 1957 highway program carries a total of $103 million for expressway construction and right-of-way acquisition, according to Highway Superintendent William J. Mortimer. A substantial portion of the funds will come from a $245 million bond issue approved two years ago for expressway construction.

About $15 million will be spent on initial construction of the 6 mile, $40 million stretch of Northwest Expressway from O'Hare International Airport to Edens Expressway interchange. Originally this was part of the Illinois Toll Road system. The county will also spend $9 million this year on additional construction of Congress St.; $43 million on the South Route and $15 million on the east leg of that route; $2 million on Kingery Expressway; $7 million on the Southwest Route; and $12 million on the Northwest Expressway and its feeder routes.

Chicago also is proud of its recent industrial developments. Last year, a record-breaking $562 million was spent in the metropolitan area on new construction of industrial plants, expansion of existing factories and acquisition of land or building for industrial purposes, reports Thomas H. Coulter, chief executive officer of the Chicago Association of Commerce and Industry.

This year's industrial developments are apt to equal or even exceed those of last year, say some industrial leaders'. Incentives for this continued industrial growth are the manufacturing and shipping potentials of Chicago's Lake Calumet Harbor and the St. Lawrence Seaway program; increasing demands for steel, fabricated metal products, building products, and both electrical and non-electrical machinery.

Structural steel shortages continue to exist, but plans are under way for improving the supply. U. S. Steel is increasing the steelmaking capacity of its Chicago district plants by 1.3 million ingot tons annually. This means an additional 900,000 tons of steel products, most of which will be plates and structural shapes now in short supply. Bethlehem Steel Corp. plans a new steel mill on a 3,500 acre site near Gary, Ind. southeast of Chicago, with an estimated ingot capacity of 2 million tons annually.

Chicago builders and materials suppliers see a continuing strong demand for their products in a number of construction fields other than highways and industrial construction. Homebuilding is expected to be slightly less this year—in both the number of starts and dollar volume of work put in place—than in 1956 when the regional output of new homes totaled $39,900 at a cost of $607 million.

The demand for new apartments far exceeds the supply both in Chicago and suburban areas. Builders say the number of units to be built in 1957 will be at least 10% more than last year when 8,700 units were built at a cost of about $75 million.

Earlier this year, eight big apartment projects were announced, having a combined total of about 2,000 units.

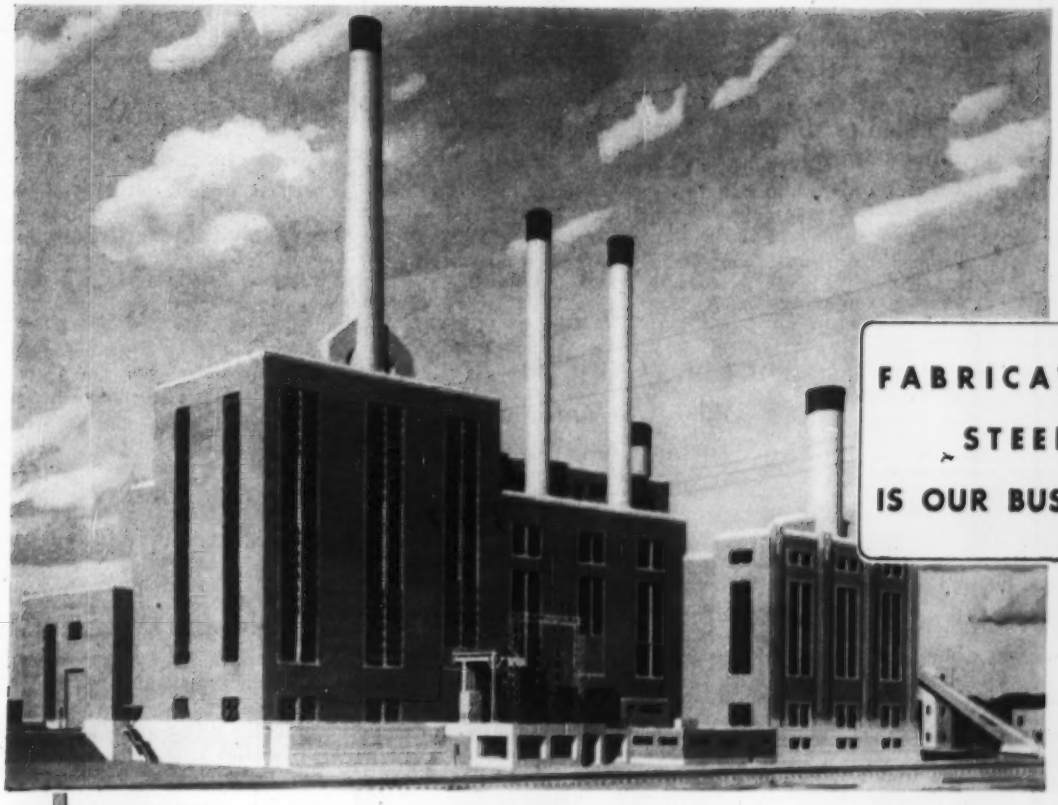
The shopping center boom in Chicago land is leveling off although a fair rate of construction is expected to continue. Tight money, increased building costs and higher land values tend to discourage new developments in this field.

Chicago's business district is undergoing a new-building and modernization program of major scope.

Now under construction are several major structures including Inland Steel Company's 19 story office building in the heart of the Loop, and the 21 story Borg-Warner office building on Michigan Ave.

School building is another important factor in Chicago's complex construction market. Additional buildings and facilities must be provided for an additional 15,000 students each year in the city. And, in suburban areas, a number of new schools also are under construction or being planned. Contractors also are bidding on a variety of other work including hospitals, churches, waterworks improvements and sewage treatment facilities.

According to some construction analysts, the amount of construction already under way in the metropolitan Chicago area indicates that the dollar volume of work put in place during the first half of this year will at least equal that completed during the first six months of 1956. It may be more.



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Expenditures Rise

Outlays for construction top year ago total by 3%

New construction put in place in January and February totaled $6 billion, an increase of 3% over the first two months of 1956—foretelling another record year if the spending rate continues.

The Commerce and Labor Departments construction report released last week, however, has this warning: February construction did not follow the booming January activity, declining 6% from the January high. So, the reports for the coming two or three months will be crucial and will determine whether the building rate for the first two months will hold up, or follow the February drop.

Seasonally adjusted expenditures for January-February were at an annual rate of $44.7 billion, compared with actual outlays of $44.3 billion in 1956. February work put in place totaled $2.9 billion, compared with $2.8 billion in 1956. But, January 1957 work put in place totaled an estimated $3 billion.

The housing slump accounted for much of the narrowing of construction increase this year over last. Both in January and February, private residential construction was under last year. In February, private residential outlays were an estimated $934 million, compared with $998 million in February 1956. In January 1957, private residential construction totaled an estimated $1 billion.

But the declines in housing, and in store building—which was down 4% from January and 22% from February 1956—were offset, the government reports, by increases in almost all other types of private construction.

Industrial plants, office buildings, churches, schools, hospitals and public utilities were at record levels. Comparing January-February 1957 with those two months of 1956, here are some estimates: private industrial, $532 million over $448 million; hospitals, $67 million over $51 million; public utilities, $696 million over $675 million; public construction, $1.7 billion over $1.5 billion; highways, $425 million over $415 million.

Expansion of Port Area Planned for San Diego

Plans for the joint development of a waterfront industrial area 4 miles long in the South Bay area of San Diego County will be submitted to three sponsors in mid-April.

According to plans prepared by the consulting firm of Mohr, Adams & Plourde, the $35 million project will include construction of a 25,930 ft bulkhead and the filling in of tidelands inside the bulkhead line to provide 2,000 acres of industrial sites.

The project is being sponsored jointly by National City, Chula Vista, and the Santa Fe Railroad.

Fewer Home Buyers?

Survey of consumer plans foresees housing dip

A small decline in the number of persons planning to buy used and new houses during 1957, compared to a year ago, was reported this week by the Federal Reserve Board's 12th annual survey of consumer finances. The survey is made by Survey Research Center of the University of Michigan. Findings are based on about 3,000 family spending units scattered in 66 sampling areas.

Because consumers change their minds as economic conditions change, their intentions as reported early each year do not always coincide with actual results for the year. But the surveys nevertheless have earned a reputation for forecasting general trends in housing, home repairs, auto sales and major household appliances.

Early in 1956, 9.4% of families interviewed intended to buy a house during the year; early this year, the percentage was 8.4. Due to possible sampling errors in a survey of this size, officials do not place too much significance on a decline of that size.

Early last year, 22.2% of those surveyed planned to spend $50 or more on home improvements during the year. This year, the percentage is 24.

Plans to purchase both autos and major home appliances are at the same level this year as a year ago.

Included in the survey are questions relating to consumers' general attitude toward the economy, and these reflected a mixture of optimism and caution. About 40% of the families expect increases in their incomes this year, slightly more than a year ago.

In general, officials of the Federal Reserve summed up the survey as showing that consumers "continue optimistic about the future and plan to make major expenditures to about the same extent as last year."

There was no judgment expressed by officials as to wether would-be purchasers of homes will be able to borrow enough money. Intentions to buy early in 1956, for example, indicated a housing year at the same level as 1955.

Slum Policy Change

Big clearance projects ruled out; cost too high

After a year's study, Philadelphia officials have decided the city cannot clear its slums. In the future, the city will concentrate on trying to halt the spread of the slums.

The new Philadelphia policy represents a major change. It is based, officials say, on the fact that the city has only $60 million with which to do a $1 billion job.

Conservation of good neighborhoods will get priority.

Over the next six years, the $60 million in federal, state and city funds will be allocated on this basis:

- $15 million for the central section of the city.
- $15 million for existing slum-clearance areas.
- $15 million for good neighborhoods located on the fringes of the slums. This is a new idea for Philadelphia. The money will be used to demolish isolated ramshackle properties and to condemn neighborhood nuisances.
- $15 million will go to Eastwick, to slum clearance for public housing and to redevelopment near the University of Pennsylvania and along Market St. in West Philadelphia.

During the next six years, the city will battle against blight in 70 neighborhoods. But there will be no new major slum-clearance projects, other than in areas such as Temple and Poplar, where site work is under way.

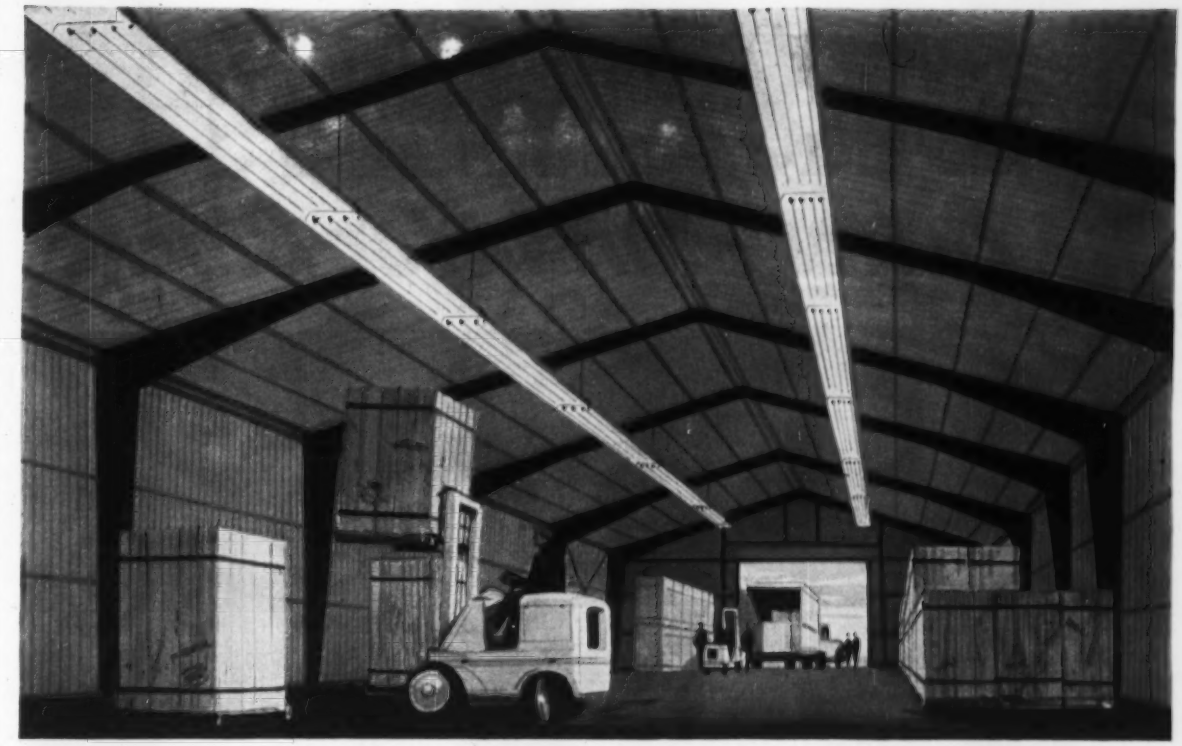
Development coordinator William L. Rafsky pointed out that it has cost up to $150,000 an acre to acquire and clear slum land.

Engineers to Seek Site For New Memphis Bridge

The Tennessee Highway Department has announced it will award a contract to Modjeski & Masters, Harrisburg, Pa., for an $18,000 survey on location of a Mississippi River bridge opposite Auction St. in Memphis. The proposed new crossing will be a part of the Memphis Expressway system.

This move was deferred temporarily when the Arkansas Highway Department refused to be a party to the project (ENR Feb. 28, p. 25). Tennessee now will go ahead on its own.

The survey will seek a suitable location of piers to overcome any objections by navigation interests, and provide a general design for the structure.



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BRIXMENT

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BETTER BODY

When concrete block are laid, the mortar should have "body", to support the weight of the unit, thus holding it up to the line. If the mortar lacks body, the block will settle below the line even if a thick bed of mortar has been spread.

At the same time, plasticity is required. Unless the mortar is plastic, the bricklayer cannot quickly and accurately tap the block down to the line.

Brixment mortar has body and plasticity. It is firm but not stiff — soft but not sloppy. This combination of body and plasticity makes Brixment the best possible mortar to use with concrete blocks.

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Carpenters vs. sheet metal workers . . .

Confusion Arises Over Jurisdictional Disputes Plan

Jurisdictional disputes between the building trades continue to raise a number of significant but still unanswered questions.

In defiance of existing procedures for settling such disputes, work stoppages have occurred within the last few weeks on a General Electric Co. project in Kentucky and on the nuclear reactor under construction in Shippingport, Pa. Concurrently, the National Labor Relations Board has been inconclusively tossing around a procedurally complicated dispute lathers have had with carpenters for several years.

Principal machinery for handling work assignment disputes is the National Joint Board for the Settlement of Jurisdictional Disputes in the Construction Industry. Voluntarily established by agreement between labor and management, it is now about to conclude its ninth year of operation.

The agreement, which seeks to encourage settlements by union agreements on both the local and national levels, prohibits work stoppages pending board determinations of a dispute and requires immediate acceptance and compliance with board decisions. To promote the orderly solution of conflicting claims, the AFL-CIO Building and Construction Trades Department has constitutionally required, over the lathers' protest, its 19 affiliated unions to recognize and be bound by the Joint Board procedure.

In the overall picture is the National Labor Relations Board, which is empowered to "hear and determine" such disputes and to "issue an award." So far, the NLRB has declined to entertain a dispute between parties theoretically subject to the Joint Board and, even where one party is outside the scope of the Joint Board, it has avoided making an affirmative work assignment.

The Joint Board procedure is generally considered the most workable plan yet devised and is claimed by some to be about 98% effective. Despite the order it has made out of the chaos of the past, a few "bugs" admittedly remain. Here are some recent examples:

• **Kentucky**—Two weeks ago in Louisville, Falls Cities District Council of Carpenters protested assignment of metal-scaffolding work to Sheet Metal Workers Local 110 at a General Electric Co. project. Contrary to Joint Board procedure and in defiance of the Louisville Building Trades Council, the project was picketed by the carpenters, idling 650 workers and stalling construction for two days. Circumventing an existing Louisville jurisdictional peace plan, the two groups, in a move that should have been automatic under the Joint Board procedure, agreed to submit the dispute to the Joint Board and to be bound by its decision. And contrary to board procedure, performance of the disputed work was postponed pending that decision.

• **Shippingport**—Last month, Dravo Corp. assigned installation of 24 gage, asbestos-coated metal siding at the nuclear energy, water reactor construction project in Shippingport to sheet metal workers. The carpenters, noting that the siding was fastened to wood, protested the assignment and—contrary to Joint Board procedure—staged a three-day walkout.

The dispute was referred to the Joint Board but the sheet metal workers completed the work and the carpenters returned to their jobs before a decision was made. The board, which renders only spot decisions and then only when a dispute is alive, never acted.

• **Labor board**—Meanwhile, the National Labor Relations Board—unless it faces up to the issue—has become almost hopelessly entangled in the whole jurisdictional picture.

Last month, for example, Carpenters Local 60 challenged NLRB's right to entertain an unfair labor practice charge stemming from a jurisdictional dispute between Local 60 and members of the coopers union over tank work at an Indianapolis construction project. The NLRB had taken the case under Section 10 (k) because the coopers are not under the Joint Board and the trial examiner ruled that the carpenters could not lawfully try to pressure the employer into the work assignment they

(Continued on page 116)

Labor Protests Newest Right-to-Work Bill

Thousands of Indiana AFL and CIO members poured into the state house at Indianapolis two weekends ago in an unsuccessful effort to persuade Republican Governor Harold W. Handley to veto a right-to-work bill. Passed by the legislature with only 16 votes to spare, the bill became law without the governor's signature on Mar. 5, making Indiana the first major industrial state in the nation to ban union-shop agreements.

Similar laws, outlawing union membership as a condition of employment, exist in 17 other states, most of which are in the South. The right to enact such laws is granted by Section 14 (b) of the Taft-Hartley Act.

wanted. Pointing to the fact that the NLRB had failed to resolve the dispute on its merits by making a work assignment decision, the carpenters later claimed the Section 10 (k) proceeding was defective.

At the same time, another NLRB trial examiner has ruled that the Cleveland lathers, who claim not to be bound by the Joint Board, can't be tried on an unfair labor practice charge, arising out of their efforts to force assignment of acoustical ceiling work to them, if the NLRB has declined, as it did, to hear the dispute under Section 10 (k). The suggestion is that either the Taft-Hartley Act is legally incapable of handling jurisdictional disputes or NLRB doesn't know what the law is.

Ever since the NLRB deferred to the Joint Board in the Lee Case on the grounds that Congress preferred the voluntary form of settlement where available, the lathers have consistently but unsuccessfully tried to divorce themselves from the Joint Board procedure and to get a full-dress airing of their acoustical ceiling grievance with the carpenters in another forum. In one of the latest moves, the NLRB has told the Lathers' Local 9 that it cannot lawfully pursue the dispute in the form of a strike aimed at getting a labor contract clause which would give them the disputed work.

Upshot is that the NLRB is slowly being jockeyed into the position of having to give both labor and management a better understanding of how the Joint Board, and non-compliance with its procedure, fits into the scheme of things under the Taft-Hartley Act.

Secondary Boycotts

NLRB gives protection to public construction jobs

Public construction projects are now accorded protection from strikes that constitute secondary boycotts.

The National Labor Relations Board has reversed an eight-year-old ruling that exempted federal, state and local governmental agencies from Taft-Hartley Act protection against secondary boycotts because they are "political subdivisions" rather than "persons".

Unions in the construction industry have had more leeway, as a result, to engage in strikes and other activities to dissuade them from dealing with nonunion contractors. The magnitude of the federal highway and other public works programs makes the new decision particularly significant.

In a split decision (3 to 1) last week, the NLRB overruled its 1949 decision that "political subdivisions" do not qualify as "persons" and are, therefore, not subject to the law's secondary boycott provisions. The board did so in the wake of a Supreme Court decision that the majority interpreted as a challenge to its old position.

The case involved a strike by the International Brotherhood of Electrical Workers during construction of the New Castle County airport passenger terminal in Delaware. The project was picketed in an effort to prevent the county from using a nonunion electrical contractor. Picketing was successful and members of other crafts refused to cross the picket lines.

All members of the board considered the IBEW action a secondary boycott but split on the procedural implications of making the prohibitions of the law applicable. In his dissent, Abe Murdock, who opposed use of a cease and desist order, said that governmental agencies should not be considered "persons" under the act, in part because labor unions have no "correlative rights" to take action against them.

The essence of the law's secondary boycott provision is that it prohibits the use of pressure to force "any employer or other person" to cease doing business with "any other person".

The NLRB decision is directed at the word "person" only as used in the secondary boycott section. It does not rule that government agencies are "employers" so as to bring them within other sections of the law, such as those relating to other unfair labor practices or to representation elections, which use the term "employer" rather than "person".

Baltimore Building Trades Absolved in Strike

The National Labor Relations Board has written another chapter on the attack launched two years ago against open-shop contractors by the AFL-CIO building trades unions in Baltimore, Md. It has exonerated the Baltimore Building and Construction Trades Council from any liability for a strike against Selby-Battersby & Co. that occurred during the extension of the "Chicago Plan" to Baltimore (ENR June 7, 1956, p. 163).

Late last spring, NLRB trial examiner Alfred Wheatley had held the Council legally responsible for the Selby-Battersby secondary boycott conducted by several of the Council's affiliates. Wheatley admitted that the Council had played no active role in directing the plan beyond participating in its conception but reasoned that union efforts to reduce the friction generated by open-shop conditions was in the nature of a joint venture from which the Council couldn't be extricated. These findings and conclusions were reversed by the board on Feb. 15 and the complaint against the Council dismissed.

The Baltimore episode stemmed from labor and management efforts to end the labor strife with which the Baltimore construction industry was plagued. As a means to that end, a new arbitration procedure was established to eliminate strikes, lockouts and work stoppages, and this was implemented by adoption of a standard agreement for use in labor contracts by the participants. To eliminate the source of much of the existing friction, the standard agreement at first relieved union workers from any compulsion to work with nonunion men and was later changed to provide that union contractors would be supplied with labor only if they dealt exclusively with union contractors. Result was an inducement to union contractors not to sub for open-shop generals. Selby-Battersby was struck following its refusal to sign the standard agreement but the unions involved denied the strike was related to that refusal. The company filed unfair labor practice charges and, after settlement was reached individually with the striking unions, the case was continued against the Council.

In absolving the Council, the board said the evidence "is insufficient to sustain a conclusion of Council responsibility". It found the initial intent was to exclude the Council from participation in the plan and saw no evidence in the operation of the plan to show that this intent had failed.

Bricklayer Apprenticeship Awards Are Due in Spring

The National Bricklayer Joint Apprenticeship Committee has announced that it will meet in Washington, D. C., on April 12 to select the winners of the first annual awards to local bricklayer joint apprenticeship committees.

Adopted last summer, the system of annual awards is designed to encourage an increase in the number of apprentices being trained.

The Associated General Contractors of America, the Mason Contractors Association of America and the bricklayers union will have one representative each on the judges' committee.

OFFICIAL PROPOSALS

RATE: The rate for Official Proposal advertising is $2.10 per line or fraction set solid. Where the advertisement is set other than solid, the space is measured by total space occupied and charged on basis of 12 lines to the inch.

CLOSING DATE: Friday 10:30 A.M. for issue dated the following Thursday.

SEND COPY TO: Official Proposal Division, Engineering News-Record, P.O. Box 12, New York 36, N. Y.

Bids: March 25, 1957

Greater Hartford Bridge Authority

NOTICE TO CONTRACTORS

Sealed bids will be received by the Greater Hartford Bridge Authority at 71 Capitol Avenue, Hartford, Connecticut, until 2 P.M., E.S.T., Monday, March 25, 1957 and, at that time, publicly opened and read—for the construction of:

ROADWAY APPROACHES TO WOLCOTT AVENUE CROSSING IN TOWNS OF WINDSOR AND SOUTH WINDSOR, CONN.

Approximately 8,026 linear feet of grading, drainage and bituminous concrete pavement, including two prestressed concrete girder grade separation structures.

Contractor must submit statement for pre-qualification to the Authority (7) days prior to submitting bids.

Bid bond forms, prequalification forms and proposals must be obtain d at the Authority office at 71 Capitol Avenue, Hartford, Connecticut. Plans and specifications may be examined at the Authority office or may be purchased by check payable to Greater Hartford Bridge Authority in the amount of $30.00, including tax, for each set.

The minimum rates of wages to be paid labor of the various classifications shall be in accordance with the current schedule of wages established by the State Labor Commission as provided in Section 1194D of the 1955 Supplemental to the General Statutes of the State of Connecticut entitled "Rates of Wages for work on State Highways".

Surety Company Bond, on form furnished by the Authority for at least one-third of the amount of the bid, must accompany each proposal; certified check will not be accepted. The Greater Hartford Bridge Authority reserves the right to reject any and all bids.

The Engineer for the above project is Thomas Worcester, Consulting Engineer, 85 State Street, Boston, Mass.

W. Burke Smith
Director
Greater Hartford Bridge Authority

Bids: April 9, 1957.

New York City Invites Bidders Pumping Plant Demolition

SIX 20 M.G.D., 600 FT. LIFT (5 STAGES) VERTICAL MOTOR-DRIVEN PEERLESS PUMPS; SIX 4000 VOLT, 900 R.P.M., 2500 H.P. SYNCHRONOUS MOTORS, COMPLETE WITH MOTOR CONTROLS AND AUXILIARY EQUIPMENT; TWO B.P. 6000# CHLORINATORS WITH EVAPORATORS AND SCALES; HOISTING, HEATING AND VENTILATING EQUIPMENT, PUMPS AND EQUIPMENT IN EXCELLENT CONDITION; FIVE YEARS OLD, AND OPERATED FOR SEMI-MONTHLY TEST RUNS ONLY.

Sealed bids will be received by the Commissioner of Water Supply, Gas and Electricity, at room 2351, Municipal Building, Manhattan, N. Y. 7, N. Y. as follows until 10:30 A. M. Tuesday April 9-1957. For furnishing all labor and material necessary and required for removing all equipment from and demolishing the Hudson River Pumping Station near Chelsea, Dutchess County, N. Y. ALL MATERIALS AND EQUIPMENT IN, OR FORMING PART OF THE STATION SHALL BECOME THE PROPERTY OF THE CONTRACTOR. Prospective bidders may obtain a copy of the contract documents and specifications by sending a certified check for $1.00 made payable to the order of the Comptroller of the City of New York, to the Department of Water Supply, Gas and Electricity, Room 2351 Municipal Building, New York 7, N. Y.

Bids: March 21, 1957

New York State Road Work

NOTICE TO CONTRACTORS

STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of Highway Law, sealed proposals will be received until 10:30 a.m., Eastern Standard Time, on March 21, 1957, by Henry A. Cohen, Director, Bureau of Contracts and Accounts, 14th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y. for:

SOIL EXPLORATIONS AND FOUNDATION INVESTIGATION AT VARIOUS SITES ON FEDERAL INTERSTATE ROUTE 502, SECTIONS 7A, 7B, 7C, 7D, ESSEX-CLINTON COUNTY LINE TO CANADIAN BORDER, TOWNSHIPS of AUSABLE, PLATTSBURG, BEEKMANTOWN, CHAZY, PERU, CHAMPLAIN, CLINTON COUNTY, WHICH CONSTITUTES CONTRACT No. SPEC. F.A.I. SM-99 PROJECT No. I-1119(1)

Maps, plans and specifications may be examined and obtained at the following offices:

(a) Bureau of Contracts and Accounts, 14th Floor, The Governor Alfred E. Smith State Office Building, Albany 1, New York.
(b) Mr. Robert W. Sweet, District Engineer, 444 Van Duzee Street, Watertown, New York.
(c) Mr. William M. Trainer, Associate Contract Engineer, Department of Public Works, 270 Broadway, New York City.

The deposit for a set of plans, specifications and proposal forms is $5.00. A refund in full will be made to bidders for return of one set in good condition within 30 days of award or rejection of bids; refund for all other sets in good condition, similar period, will be 50 percent of deposit.

The Engineer's Estimate of cost for this work is $49,025.00.

Proposal for this contract must be submitted in separate sealed envelope with the name of the contract plainly endorsed on the outside of the envelope. Proposal must be accompanied by draft or certified check, payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum of $2500.00. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law, as set forth in "Instruction to Bidders."

The right is reserved to reject any or all bids.

J. W. JOHNSON
SUPERINTENDENT OF
PUBLIC WORKS

Bids: March 27, 1957

City of Houston

NOTICE TO BIDDERS

Sealed bids, in duplicate, will be received by the City Secretary of the City of Houston, in Room 206, City Hall, until 10:30 A.M., Wednesday, Mar. 27, 1957, and all bids will be opened and publicly read in the City Council Chamber at 10:45 A.M. on that date for the following work—CONSTRUCTION OF

SHEPHERD-MEMORIAL GRADE SEPARATION.

Plans, specifications and necessary information may be obtained from the Director of Public Works.

Bidder's Bond, Certified Check, or Cashier's Check in an amount equal to 10 per cent of the highest amount bid must accompany each bid.

The City reserves the right to reject any and all bids or to accept any bid deemed advantageous to it.

Dated this 26th day of February, 1957.

M. H. Westerman
City Secretary

Bids: March 21, 1957.

Yorktown Heights High School

SECTION A
NOTICE TO BIDDERS

Sealed proposals for the construction of an Addition to the Brookside School, Yorktown Heights, New York, will be received by the Board of Education, Central School District No. 2, Towns of Yorktown, New Castle and Cortlandt, Westchester County, New York, at the Yorktown Heights High School Auditorium until 8 o'clock P.M., E.S.T., on March 21, 1957, at which time and place the proposals will be publicly opened and read.

Separate proposals will be received for the following work:

Contract No. 1—General Construction
Contract No. 2—Plumbing
Contract No. 3—Heating and Ventilating
Contract No. 4—Electric

Forms of Proposal, Drawings, Specifications and other Contract Documents may be obtained on or after March 1, 1957, by each bidder on Contracts No. 1, 2, 3 and 4, at the office of the Architects, Ferrenz & Taylor, 152 West 42nd Street, New York 36, New York. One complete set of General Construction, Plumbing, Heating and Ventilating and Electric will be furnished to each bidder upon receipt of a deposit check made payable to The Architects for the amount of Fifty Dollars ($50).

Deposits will be refunded upon return of the documents in good condition within 30 days after opening of bids provided that a proposal has been submitted. Deposit shall be forfeited in case of failure to submit a proposal. Additional sets or portions thereof may be obtained by any bidder upon payment of the actual cost of reproduction.

Proposals shall be made and received upon the following conditions:

Each bid must be accompanied by cash or a certified check, made payable to the Board of Education, or a bid bond. The amount of such bid security shall be five (5%) percent of the amount of the bid, as a guarantee that in case the contract is awarded to the bidder, he will within ten days thereafter execute the contract and furnish satisfactory bonds. Upon failure to do so he shall forfeit the security as liquidated damages.

The cash or checks of all except the three lowest bidders will be returned within three days after the opening of the bids, and the remaining cash or checks will be returned when the contract is executed, or in any event within 45 days after the opening of the bids. No bid may be withdrawn within forty-five days after the opening thereof.

The successful bidders will be required to furnish a payment and performance bond in the form incorporated herein, and with securities satisfactory to the Board, which bonds shall be in the amount of the contract and shall be conditioned upon the faithful performance of the contract and the payment of all claims for materials and labor furnished under the Contract.

The time for completion shall be stated by the bidder in his proposal.

The Board of Education reserves the right to reject any or all bids and to waive any irregularities, or to accept any proposal by any bidder which in the opinion of the Board of Education will be in the best interest of the Board.

February 25, 1957.

Board of Education
Central School District No. 2
Towns of Yorktown, New Castle and
Cortlandt, Westchester County,
New York
By Bertha Smith, Clerk

OFFICIAL PROPOSALS

Bids: March 21, 1957

New York State Road Work

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of the Highway Law, Canal Law, Public Buildings Law, and Article 2, Title 9 of the Public Authorities Law, and special provisions for projects financed with Federal Aid Funds, sealed proposals will be received until ten-thirty o'clock A.M., eastern standard time, on the 21st day of March 1957, by Henry A. Cohen, Director, Bureau of Contracts and Accounts, 14th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name	Miles	Type	Deposit	Estimated Cost of Work
DISTRICT No. 1, G. L. NICKERSON, District Engineer, 353 Broadway, Albany 1, N. Y.						
Albany (Rte. 9 & 7)	FARC 57-31	Loudon Road Pt. 2, S.H. 119 Troy-Schenectady Pts 3 & Pts. 4, S.H. 604-630 Project U-639(9), U-411(3)	1 39	9" Cem. Conc. Pavt. 24', 2 @ 24' Var. Wide = 1.09 Mi. Asph. Conc. = 0.30 Mi. 2 Comp. W.F. Beam Brs. 60' Ea.	$120,000 Plans $25	$2,302,000
Essex (Rte. 9)	FARC 57-11	Elizabethtown-Keeseville, Pt. 1, S.H. 8302 Project F-459(3)	8 86	Asph. Conc., Opt. = 8.84 Mi. Misc. Work = 0.02 Mi.	$70,000 Plans $25	1,237,000
Essex (Rte. 9)	FARC 57-13	North Hudson-Euba Mills, Pt. 2, S.H. 5182 Euba Mills-New Russia, S.H. 5117 Project F-383(9)	2 26	9" Cem. Conc. Pavt. 24' Var. Wide = 2.21 Mi. Asph. Conc., Opt. = 0.05 Mi.	$45,000 Plans $15	811,000
DISTRICT No. 2, LACY KETCHUM, District Engineer, 109 No. Genesee St., Utica, N. Y.						
Oneida	M 57-2	Nine Mile Feeder at Trenton Fall	....	13.5' Corrug. Plate Arch Extension of Exist. Culvert	$900 Plans $10	16,000
DISTRICT No. 3, W. ROBINSON, District Engineer, Weigh Lock Building, 301 E. Water St., Syracuse, N. Y.						
Onondaga	FISH 57-6 FASH 57-7	Interstate Route 5 (Mattydale-Brewerton) and Access & Local Cross Roads including S.H. 452, S.H. 5470 and FASH 54-3: North Syracuse Connection (Rte. 11 to Interstate Rte. 5) Project I-1118(6), U-463(15)	9 80 (8 53) (Acc.)	9" Cem. Conc. Pavt. 2 @ 36' Var. Wide = 12.45 Mi. Asph. Conc. = 5.37 Mi. Misc. Work = 0.51 Mi. 7 Hy. Sps. Comp. I-Beams 316.7', 148.5', 264.3', 318.6', 156', 241' & Abt. only for 178.1' Viaduct with Elev. Ramps	$612,000 Plans $100	11,122,000
Onondaga	FISH 57-8	Interstate Route 5 (Mattydale-Brewerton) (Mattydale Viaduct) Project I-1118(10)	0 43	Cem. Conc. Br. Pavt. Superstruct. & Piers Only for Viaduct with Elev. Ramps 1781.1'	$205,000 Plans $25	3,723,000
Onondaga and Oswego	FISH 57-3	Interstate Route 5 (Brewerton-Central Square) and Access or Local Roads Project I-1118(4)	3 32 (1 01) (Acc.)	9" Cem. Conc. Pavt. 2@36' Wide = 2.83 Mi. Asph. Conc., Opt. = 0.30 Mi. Asph. Conc., Opt. Acc. = 1.01 Mi. Misc. Work = 0.19 Mi. 3 Hy. Sps. Comp. I-Beams 244.9', 90' & 127.6' Substructure only for Steel Arch Br. 448'	$277,000 Plans $50	5,035,000
Oswego	FISH 57-9	Interstate Route 5 (Brewerton-Central Square) (Oneida Lake Bridge) Project I-1118(9)	0 17	Cem. Conc. Br. Pavt. = 0.09 Mi. Asph. Conc. = 0.08 Mi. Superstruct. Only for Steel Arch Br. 448'	$108,000 Plans $25	1,963,000
Seneca (Rte. 96)	FARC 57-24	West Junius-Waterloo Pt. 1, S.H. 8056 Waterloo-Burns Corner, S.H. 1400 Waterloo Village-North Road, S.H. 1605 Project F-97(6)	5 41	Asph. Conc., Type 1A	$24,000 Plans $10	453,000
DISTRICT No. 4, B. F. PERRY, District Engineer, Barge Canal Terminal, Rochester 1, N. Y.						
Livingston (Rte. 255)	FARC 57-28	Dansville-Conesus, Pts. 2 & 3 S.H. 1702 Project S-488(1)	5 87	Asph. Conc., Opt.	$20,000 Plans $10	363,000
Monroe	FAC 57-3	City of Rochester: Inner Loop (Front St. to North St.) Project U-1089(7)	0 06	Demolition of Building	$5,000 Plans $10	92,000
DISTRICT No. 5, E. G. H. YOUNGMANS, District Engineer, 65 Court St., Buffalo 2, N. Y.						
Erie	D.A.57-1	Staley Road Project D-AD-10(1)	2 77	Asph Conc., Opt.	$12,000 Plans $10	221,000
DISTRICT No. 6, J. H. THOMAS, District Engineer, 30 W. Main St., Hornell, N. Y.						
Tioga (Rte. 17, 17C)	FARC 57-25	Waverly-Owego, Pt. 3, S.H. 5257, Owego-Campville, Pt. 1, S.H. 8475, Owego-Campville, Pt. 3, S.H. 1870, Campville-Endicott, Pt. 1 & 2, S.H. 8376 Project F-498(5); F-530(7)	4 93	Asph. Conc., Opt. = 4.84 Mi. Misc. Work = 0.09 Mi. Repair of 2 Exist. Bridges	$50,000 Plans $25	898,000
DISTRICT No. 7, R. W. SWEET, District Engineer, 444 Van Duzee St., Watertown, N. Y.						
*St. Lawrence, N. Y. and Grenville, Ont., Can.	O.B.A.57-1	*Ogdensburg Bridge, Cont. 1	....	Bridge Substructure for Piers M-1 to M-6 Incl.	US $230,000 Plans $10	US 4,200,000
DISTRICT No 8, KURT G. RAUER, Acting District Engineer, Pleasant Valley Road, Poughkeepsie, N. Y.						
Orange	C.T. 57-1	N. Y. State Thruway-Catskill Sect.-Sub. 7 (Suffern to Harriman) (Arden Sta. Rd. Bridge)	0 03	Asph. Conc., Opt. Widening Existing 45.5' Bridge	$3,500 Plans $10	62,000
Orange (Rte. 32)	R.C. 57-23	Newburgh-Woodbury, S. H. 42	3 93	Asph. Conc., Opt.	$19,000 Plans $10	353,000
Ulster Rte. (32, 213)	FARC 57-21	Rosendale Village, S.H. 1419 Rosendale-Perrines Bridge, S.H. 419 Kingston-High Falls, S.H. 229 Project F-613(11)	7 40	Asph. Conc., Opt.	$42,000 Plans $15	768,000
Westchester (Rte. 116)	FERC 57-29	Batley Corners-State Line, S.H. 1340 Project ER-46(1)	0 21	9" Cem. Conc. Pavt. 20' Wide Prestressed Conc. Beam Br. 47'	$8,000 Plans $10	150,000
Westchester (Rtes. 116, 121)	FERC 57-30	Turk Hill-Putnam County Line, S.H. 151 Peekskill-Salem Center, Pt. 2, S.H. 262 Project ER-45(1)	0 47	Asph. Conc., Opt. Prestressed Conc. Beam Br. 81'	$13,000 Plans $10	236,000
DISTRICT No. 9, J. C. FREDERICK, District Engineer, 71 Frederick St., Binghamton 21F, N. Y.						
Otsego (Rte. 23)	FARC 57-26	South New Berlin-Morris, Pt. 2, S.H. 8517 Project F-620(9)	7 09	Asph. Conc., Opt.	$30,000 Plans $15	553,000
Sullivan	FASS 57-3	Hartwood-Oakland Valley Sects. 1 and 3, C.R. 48 & 49 Project S-452(1)	2 72	Bit. Mac. Pen. Meth. Ty. 1 Prestressed Conc. Beam Br. 183'	$40,000 Plans $15	744,000
DISTRICT No. 10, M. E. GOUL, District Engineer, 325 W. Main Street, Babylon, L. I., N. Y.						
Kings	FAPE 57-1	Prospect Expressway Cont. 4A (10th Ave. to Greenwood Ave.) Project U-1081(3)	0 58 (1 31) (Acc.)	9" Cem. Conc. Pavt. (Carbon Black) 2@36' Var. Wide = 0.54 Mi. 9" Cem. Conc. Pavt. Var. Wide = 0.37 Mi. Sheet Asph. Pavt. = 0.64 Mi. Granite Block Pavt. = 0.30 Mi. Misc. Work = 0.04 Mi. 2 Hy. Sps. Weld. Fr. Beam & Girder 108.3' & 107.8' 1 Ped. Br. Plate Girder 139.5' 1 Ped Br. Steel Rig. Fr. 123'	$245,000 Plans $100	4,491,000
Nassau	NSP 57-1	Northern State Parkway	1 08 (1 59) (Acc.)	8" Cem. Conc. Pavt. (Carbon Black) 2 @ 48' Var. Wide = 0.93 Mi. 8" Cem. Conc. Pavt. Var. Wide = 1.11 Mi. Asph. Conc., Opt. = 0.60 Mi Misc. Work = 0.03 Mi. 2 Hy. Sps. R. C. Rig. Fre. 65.3' & 86.1' 1 Hy. Sps. Steel Beam 86.5'	$106,000 Plans $25	2,118,000
Nassau	FASS 57-4	Peninsula Blvd. Cont. No. 6, Co. Rd. Project S-319(6)	1 59 (0 31) (Acc.)	Asph. Conc., Opt. 2 Reinf. Conc. Box Brs. 20' & 20'	$98,000 Plans $15	1,784,000
Queens (Rte. 25D)	FAHHE 57-1	Horace Harding Expressway Sect. II, Cont 2 (207th St. to Cloverdale Blvd.) Project U-862(12)	1 87 (2 91) (Acc.)	9" Cem. Conc. Pavt. (Carbon Black) 2 @ 36' Var. Wide = 0.96 Mi. 9" Cem. Conc. Pavt. Var. Wide = 0.32 Mi. Asph. Conc', Opt. = 2.59 Mi. Grading, Drainage & Misc. Work = 0.91 Mi. 3 Hy. Sps. Comp. I-Beams 107', 106.8', & 105.8' 1. Ped. Overpass I-Beam 137.5'	$275,000 Plans $100	5,062,000
Suffolk	B.P. 57-47	Village of Asharoken Beach	....	Beach Protection with 5 Conc. Block Groins	$3,000 Plans $10	55,000
Suffolk (Rte. 27)	FARC 57-19	Bridgehampton-Devon, Pt. 2 S.H. 1524 Project F-559(10)	2.70	Asph. Conc., Opt. = 2.68 Mi. Misc. Work = 0.02 Mi.	$3 ,000 Plans $15	710,000

Any projects in this letting that are on the Federal Aid highway systems are subject to the provisions of the "Federal-Aid Highway Act of 1956", being Public Law 627, 84th Congress, approved June 29, 1956, and are also subject to the applicable New York State statutes.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage) Public Law 627, the minimum wages to be paid laborers and mechanics are included in wage schedules that are set out in the bid proposal.

Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts and Accounts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

*RE: O.B.A. 57-1, St. Lawrence County, N. Y. and Grenville, Ontario, Canada:

Maps, plans, specifications and proposals may also be seen and obtained at the offices of Dr. P. L. Pratley, 909 Drummond Building, Montreal, Quebec, Canada and at Modjeska and Masters, Forster at 6th. Street, Harrisburg, Pa.

The deposit for Plans and Proposal Forms for each contract is indicated above. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specification, and contract agreement, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Laws, as set forth in "Instructions to Bidders".

The right is reserved to reject any or all bids.

JOHN W. JOHNSON
Supt. of Public Works

U. S. Government

Bids: May 6, 1957.

Government of Iraq
Electrification of Northern Iraq
Contract No. 12—
String Insulator Units

The Development Board and Ministry of Development of the Government of Iraq invite tenders from qualified firms for the supply and delivery of the String Insulator Units for 300 km of 132 and 33 kv double-circuit power transmission lines for Northern Iraq.

Full information regarding this tender can be obtained on and after March 4, 1957 from Iraqi Embassy, 2135 Wyoming Avenue, N. W., Washington 8, D. C., U.S.A.

All Tender Documents are to be submitted in English to the Ministry of Development, on or before 12 noon, local time, on May 6, 1957.

Minister of Development

Bids: April 22, 1957.

Government of Iraq
Electrification of Northern Iraq
Contract No. 11—
Line Fittings and Accessories

The Development Board and Ministry of Development of the Government of Iraq invite tenders from qualified firms for the supply and delivery of the Line Fittings and Accessories for 300 km of 132 and 33 kv double-circuit power transmission lines for Northern Iraq.

Full information regarding this tender can be obtained on and after Feb. 25, 1957 from Iraqi Embassy, 2135 Wyoming Avenue N. W., Washington 8, D. C., U.S.A.

All Tender Documents are to be submitted in English to the Ministry of Development, on or before 12 noon, local time, on April 22, 1957.

Minister of Development

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-4870) will be received at Vernal, Utah, until April 9, 1957, for furnishing labor and materials for warehouse building for Flaming Gorge Government community, Colorado River Storage Project, Utah. Location near Linwood, Utah. Principal items are 7,750 cu. yds. excavation; 520 cu. yds. concrete; constructing warehouse building; and other work. Completion time 240 days. For particulars, address Bureau of Reclamation, Vernal, Utah; P. O. Box 360, Salt Lake City, Utah; or Building 53, Denver Federal Center, Denver 2, Colorado. W. A. Dexheimer, Commissioner.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-4817) will be received at Kennewick, Washington, until April 17, 1957, for furnishing labor and materials for ice preventive heating system at Roza Diversion Dam and Headworks, Yakima Project, Washington. Location near Yakima, Washington. Principal items are furnishing and installing radial gate heating system; furnishing and installing roller gate heating system; furnishing and installing electrical systems; modification of East Selah Substation; and other work. Completion time 150 days. For particulars, address Bureau of Reclamation, P. O. Box 937, Boise, Idaho; P. O. Box 516, Kennewick, Washington; or Building 53, Denver Federal Center, Denver 2, Colorado. W. A. Dexheimer, Commissioner.

Contractors Watch This Section—

for new projects. Publish your announcements through the proposal sections of *Engineering News-Record* and get their bids.

OFFICIAL PROPOSALS

Bids: April 2, 1957.

Power Authority of the State of New York

BARNHART-PLATTSBURGH
TRANSMISSION PROJECT
ADVERTISEMENT FOR PROPOSALS
FOR
THE FURNISHING AND DELIVERY OF
HIGH VOLTAGE DISCONNECTING
SWITCHES
SPECIFICATION NO. PA-6-29
CONTRACT NO. TP5

NOTICE TO CONTRACTORS: The POWER AUTHORITY OF THE STATE OF NEW YORK will receive sealed proposals for the design, manufacture, and furnishing of high voltage disconnecting switches and appurtenances for the Barnhart-Plattsburgh Transmission Project and delivery thereof f.o.b. destinations, until 10:30 A.M., Eastern Standard Time, on the 2nd day of April, 1957, at the Authority's office, 270 Broadway, Room 1305, New York, New York, at which time and place the proposals will be publicly opened and read aloud.

Bids will be received for thirty (30) high voltage disconnecting switches and appurtenances in accordance with the bidding schedule. All disconnecting switches will be installed by Others, but services of erecting engineers shall be provided by the manufacturer when and if required. Delivery of the disconnecting switches will be required June 1, 1958.

Plans, Specifications and Proposal Forms for the work will be on file in the Authority's office and in the offices of the Engineer, Uhl, Hall & Rich, 230 Congress Street, Boston 10, Massachusetts and may be inspected by prospective bidders during office hours; and may be obtained from the Power Authority of the State of New York, 270 Broadway, Room 1300, New York 7, New York, upon application and prepayment of a fee of Ten ($10.00) Dollars per initial set of contract documents and Five ($5.00) Dollars per set for additional sets, no part of which will be refunded. Two sets must be returned with each bid.

Bids will not be restricted to American manufacturers.

Bids must be made in duplicate in accordance with the instructions contained in the Information for Bidders. Guarantee will be required with each bid in an amount not less than ten percent of the gross sum bid.

The right is reserved to reject any or all bids.

W. S. CHAPIN
GENERAL MANAGER

Bids: April 9, 1957

Contract PN-360.003

ADVERTISEMENT
THE PORT OF NEW YORK AUTHORITY
PORT NEWARK
STEVEDORES GARAGE

Sealed proposals for the construction of a Stevedores Garage, together with paving and utilities therefor, at Port Newark will be received at the office of the Chief Engineer of The Port of New York Authority, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on Tuesday, April 9, 1957, at which time said proposals will be opened and read in Room 1108.

Contract documents may be seen at the office of the Engineer of Design of the Authority, Room 1115. Documents will be furnished upon deposit of $30.00 per set for not more than three sets to any one company (each set including one copy of the contract drawings). Additional sets will be furnished upon payment of $30.00 per set, which payment is not returnable. Deposits and payments shall be delivered to the Treasury Department, Room 1001, where a receipt will be issued. The receipt shall be delivered to Room 1115, where the documents will be furnished.

Those who have submitted a bid on the contract will receive a refund of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals. Those who have not submitted a bid will receive a refund of one-half of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
Donald V. Lowe, Chairman

New York, March 14, 1957

OFFICIAL PROPOSALS

Bids: April 9, 1957

Contracts 454 and 455

WEST DELAWARE TUNNEL

SEALED BIDS will be received by the Board of Water Supply, at its offices, thirteenth floor, 120 Wall Street, New York City, until 11:00 A.M., Eastern Standard Time, on Tuesday, April 9, 1957, for the following two contracts for the construction of the easterly portion of the West Delaware Tunnel of the Delaware system, comprising about 19 miles of concrete lined pressure tunnel, circular in section and 11 feet 4 inches in finished diameter, and Shafts 5 to 7 inclusive, 14 feet in diameter, which will be circular in section and lined with concrete, all as set forth in the specifications:

CONTRACT 454, for the construction of about 60,000 linear feet of tunnel, including Shaft 5, approximately 760 feet deep, and Shaft 6, approximately 780 feet deep, located in the Towns of Rockland and Neversink, Sullivan county, New York.

CONTRACT 455, for the construction of about 42,000 linear feet of tunnel, including Shaft 7, approximately 650 feet deep, and the tunnel outlet, located in the Town of Neversink, Sullivan county, New York.

A bidder on both of these contracts may, if he so desires, specify in the bid form of either or both contracts, that he will agree to make a percentage reduction from the total cost of the contract, if both contracts are awarded to him.

Pamphlets of the two contracts containing information for bidders, forms of bid and contract, specifications, contract drawings, requirements as to surety, etc., can be obtained in the Secretary's office, Room 1312 at the above address, upon application in person or by mail, by depositing the sum of $5.00 for each pamphlet. Within 30 days following the award of contract or rejection of bids the full amount of such deposit will be refunded for each pamphlet submitted as a bid and a refund of $4.00 will be made for each other pamphlet returned in acceptable condition. Arrangements will be made whereby prospective bidders desiring blueprints of the contract drawings for their own use may secure same, the cost thereof to be paid by them. For further particulars, apply at the office of the Chief Engineer at the above address.

IRVING V. A. HUIE, President, EDWARD C. MAGUIRE, HERBERT M. ROSENBERG, Commissioners; Board of Water Supply; BETTY COHEN, Acting Secretary.

Bids: March 26, 1957

Louisville Water Co.
Clarifier Basin Construction

ADVERTISEMENT FOR BIDS

Sealed bids will be received by the Louisville Water Co. at its office in Louisville, Kentucky, up to 10:00 A.M. March 26, 1957 on the following contracts:

CONTRACT A—Clarifier Basins—
General Construction
CONTRACT B—Clarifier Basins—
Basin Equipment

The plans and specifications are on file and may be examined at the office of the Louisville Water Co., and at the office of Alvord, Burdick & Howson, Engineers, 20 N. Wacker Drive, Chicago 6, Illinois.

Plans and specifications may be obtained by depositing Fifteen Dollars ($15.00) with the Louisville Water Co. or Alvord, Burdick & Howson. The deposit will be refunded to bidders who submit a bona fide bid and return the plans and specifications in good condition at the time bids are taken. Additional copies of the plans and specifications for use of subcontractors may be bought for the same price, with no refund.

Each bidder shall deposit with his proposal a certified check in favor of the Louisville Water Co. in the amount of five per cent (5%) of his bid, which shall be forfeited in case the contractor fails to enter into contract with good and sufficient bond within ten (10) days after the contract has been awarded to him.

No proposal may be withdrawn after the time for opening bids is past.

The right is reserved to reject any or all bids or waive any informality in any bid, and to accept any considered advantage to the Louisville Water Co.

LOUISVILLE WATER CO.
By: R. E. Payne
Chief Engineer & Supt.

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P. O. Box 12, N. Y. 36. March 28th issue closes March 18th.

REPLIES (Box No.): Address to office nearest you c/o This publication Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

Civil Engineer-Estimator: for industrial construction. Approximately 10-15 years of both estimating and job experience. Salary open, position permanent. Located in Florida. P-3632, Engineering News-Record.

Designers—Electrical and Piping . . . Power Plants and Industrial Buildings. Marbarry Corp., 120 Greenwich St., New York City 6, N. Y. REctor 2-3749.

Soils Engineer—prefer man with MS in soils about 1945 or 1946—to head up a design group in a firm of consulting engineers specializing in design of dams. Must be top-notch design engineer and supervisor. Salary open. Location Midwest. P-3942, Engineering News-Record.

Concrete Engineer for mix design. Capable of supervising Material Testing Laboratory for work in southern Idaho. Ample relocation allowances. Send resume to F. C. Torkelson Company, Box 185, Idaho Falls, Idaho.

Hydraulic Engineers experienced in the supervision of design of water projects, including large diameter pipe lines, pumping stations, storage reservoirs and automatic control devices. O'Brien & Gere, 400 East Genesee Street, Syracuse, New York.

Bridge Superintendents and Foremen for sizable structure project in Richmond, Virginia. P-4372, Engineering News-Record.

Irrigation Engineer—For position as assistant to Engineer-Manager on operating irrigation system, Arizona. Desire man with experience in construction and management. Salary open. Please submit record, references and salary requirement first letter. P-4257, Engineering News-Record.

Highway and Bridge Engineers—Designers, Experienced, for Permanent Positions in our New York Office. Excellent Salary Plus Overtime. Air mail resume to Farkas & Barron, Consulting Engineers, 5 Beekman Street, New York 38, N. Y., or call BEekman 3-8387.

Wanted—Dirt Superintendent to work for long established Illinois Contractor, operating in Illinois, Kentucky, Missouri. Salary commensurate with experience and ability. P-4323, Engineering News-Record.

Bridge Designers and Draftsmen with experience for permanent positions. Forward full educational, employment and personal data with salary requirements. Macomber & Faber, 1824 North Fourth Street, Harrisburg, Pennsylvania.

Soils, Asphalt & Concrete Inspectors . . . Field & Lab Tech; also Party Chief & Instrument Man. O'seas. Mild Climate. Write Mr. Levy, Patchen & Zimmerman, 120 Greenwich St., NYC 6. REctor 2-4187.

Engineers with experience in municipal and industrial waste collection and treatment, or projects of related type. Midwest consulting firm with long established practice limited to sanitary engineering projects. Please send full details of education and experience, references and approximate salary requirements. P-4461, Engineering News-Record.

Payroll and Cost Clerk for construction job site, Syracuse, N. Y. Hercules Concrete Pile Co., P. O. Box 266, West New York, N. J.

POSITIONS VACANT

Teaching position in civil engineering and mechanics starting next September. Rank and salary dependent on qualifications. Address Department of Civil Engineering, Clarkson College of Technology, Potsdam, New York.

Sales Engineer—Estimator for structural steel and miscellaneous iron fabricator. Degree in architectural or civil engineering desirable. State experience, education, age, salary requirements and enclose snapshot with first letter to Southern Iron Works, Inc., P. O. Box 430, Alexandria, Va.

Superintendent—Complete knowledge of road construction and bituminous paving. Must be able to estimate and take charge of complete road job. Year around position with reliable construction company in Central New York. P-4494, Engineering News-Record.

Civil Sanitary Engineers, Designers, Draftsmen, experienced in the design of sewers, pumping station, sewage treatment plants, water supply systems. Salary open, send resume to: W. B. Bennett, Engineer, P. O. Box 464, Bessemer, Ala.

Engineer capable of layout and takeoff for Western New York Paving contractor. Reply P-4154, Engineering News-Record.

Superintendent for Western New York paving and excavating contractor. Reply P-4155, Engineering News-Record.

Mining and Smelting Engineer. For a mature experienced man a permanent responsible position is available, with large long-established firm. Headquarters Detroit and Windsor, Ontario. Please send full resume, in confidence if requested, to P-4518, Engineering News-Record.

Estimator-Engineer for general contractor in Westchester Co. N. Y. Experienced in estimating-sewer work, water, storm drainage, excavations, roads, etc. Must be top notch in both estimating and job experience. Give age, experience, references, and salary desired. Frank Bracalello, Inc., 132 Montgomery St., Scarsdale, N. Y.

Engineering Draftsman, Sanitary Engineering experience preferred. Permanent. Send vital statistics, experience, education, salary expected, samples of workmanship and date of availability to Russell & Axon, Box 1431, Daytona Beach, Florida.

Wanted. A.I.A. Architect. Excellent opportunity in Baltimore, Md., for right man between the ages of 30 and 40. Please send complete resume. P-4525, Engineering News-Record.

Construction Engineer for foreign assignment who knows modern high pressure, large unit steam power plants. Must be of strong character and able to get along with people. Contact Gilbert Associates, Inc., Reading, Penna., Personnel Department.

Superintendent Wanted: Man experienced in construction of High Class Monumental Buildings. Only man with great depth of actual experience in this class of work should apply. P-4570, Engineering News-Record.

Civil Engineer 11: Salary range $5,720— $6,864 annually. Age: 25-55. Qualifications: B.S. degree in civil engineering plus two years' experience. Driver's permit. P-4470, Engineering News-Record.

Public Works Department Engineer and Superintendent in Western Massachusetts community, salary open, based on experience. Apply Box P-4578, Engineering News-Record, submitting resume of education and experience.

POSITIONS VACANT

Sanitary Engineer. Responsible designer, capable taking charge design small sewage treatment plants. Cleveland, Ohio. P-4553, Engineering News-Record.

Sanitary Engineer, experienced in design sewage treatment works. Permanent. Upstate New York community also Engineer Assistant for layout, inspection sewer construction, Poughkeepsie, New York area. Write experience, salary, availability. P-4577, Engineering News-Record.

Position open for Junior College Instructor in Drafting and Engineering Drawing. Apply, Director, Coalinga College, Coalinga, California.

EMPLOYMENT SERVICE

Salaried personnel, $5,000-$30,000. This confidential service, established 1929, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings. Dept. L. P. O. Box 674, Manchester, Vermont.

POSITIONS WANTED

Construction and Expediting Engineer completing four (4) years of expediting material and equipment and coordinating same with field for construction of $190 million Industrial Plant. Sixteen (16) additional years of light and heavy construction experience working as, foreman on highway construction, Field Engineer and Asst. Superintendent on building construction and Project Engineer on Dam and Building Construction. Excellent organizational abilities. Available in six (6) weeks. PW-4437, Engineering News-Record.

Accountant Comptroller experience in heavy construction, dams, roads, airfield bldgs., under ground systems, major accounting special course industrial management go anywhere, age 45. PW-4445, Engineering News-Record.

(Continued on opposite page)

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ENGINEERING NEWS-RECORD
P. O. Box 12 New York 36, N. Y.

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Several years experience in highway or bridge design preferred but not essential if educational background and engineering experience is good.

This firm of Consulting Engineers is anxious to employ men who are interested in an opportunity to work on large scale highway projects in the Philadelphia area.

Excellent working conditions. Liberal employee benefits.

ALBRIGHT & FRIEL INC.
3 PENN CENTER PLAZA
PHILADELPHIA 2, PA.

POSITIONS WANTED
Continued from opposite page

Sanitary & Hydraulic Engineer, 32, MSCE, Registered N. Y. & N J, 11 yrs. experience in water supply, sewerage and drainage facilities design and construction and office administration, U.S. and overseas. Know Spanish. Presently on European assignment, available in 60 to 90 days, as project engineer or for other supervisory job, foreign or U.S. PW-4397, Engineering News-Record.

Bridge Superintendent—Reg. Engineer—Age 30, 5 years sup. exp.—Estimate, Construct, Manage. Desires position with Western Contractor and opportunity to grow. Resume on Request. PW-4414, Engineering News-Record.

Electrical Construction Superintendent 25 years experience heavy construction. PW-4429, Engineering News-Record.

Structural Engineer, BCE, MCE. Reg. P.E.— N. Y., Age 26, 5 years experience in design and supervision of design, desires position overseas, office or field, in South America or Europe. PW-4427, Engineering News-Record.

Construction manager desires connection with out-of-state contractor planning to do business in Alabama. 30 years experience in field and office, part of this time conducting own business. PW-4365, Engineering News-Record.

Superintendent Brickmason Foreman experi-ence in industrial, commercial and residential construction knowledge of estimating quantity take-off. PW-4354, Enginering News-Record.

Bridge Engineer, M.C.E., P.E., Member A.S.C.E., 25 years experience, 10 years with State Authority as Chief Bridge Engineer in charge of design, specs and construction. Available with short notice. PW-4348, Engineering News-Record.

Draftsman, diversified structural-concrete ex-perience, desires re-locate Washington, D. C., area. PW-4321, Engineering News-Record.

Project Manager-Superintendent, Heavy & bridge construction, 19 years experience. $200. PW-4332, Engineering News-Record.

Superintendent — Engineer — Estimator — Highways—44—BS in CE., PE—Penna—supervision, estimating and layout on Earthwork, Drainage, Structures and Paving. PW-4504, Engineering News-Record.

Construction Engineer BCE—9 years experi-ence in building construction, field engineer, assistant superintendent, estimating, and expediting. PW-4464, Engineering News-Record.

Structural Engineer, age 54, sound experi-ence top flight engineering firms, industrial plants, power plants, wharves, docks, bridges, airports, etc. Permanent position good industrial firm wanted. No. East, Mid Atl. area. PW-4481, Engineering News-Record.

Professional Engineer, wide experience, will prepare Budget Cost Estimates from outline plans and for Spec. for the profession, or Competitive L.S. estimates for Contractors. PW-4493, Engineering News-Record.

(Continued on page 124)

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Permanent position available in office of long established Southern California General Contractor for Estimator with excellent references and reputation. Must be capable of complete estimate preparation. Age 25 to 35. Salary open. Send complete resume to

P-4379, Engineering News-Record,
68 Post St., San Francisco 4, California

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or write to Edward A. Kolner
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Send complete information covering qualifications, past earnings, and availability.

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Immediate openings available in our Cincinnati, Ohio office for electrical designers who have had experience in industrial plant design and layout. Degree not essential.

These positions offer opportunity for advancement and long term employment with good salaries and benefits.

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Age 40—55

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You will have to show proof of your past and present ability to sell, bid, negotiate, buy and perform on bids to industry. Our present activity varies from $75,000 to multi-million dollar bids.

Salary range will be equal to the talents required. Administrative ability and actual profit performance will be the basis for present and future income.

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In accepting this position it will be necessary for you to bring along two or three qualified assistants to handle individual projects under your supervision.

We also have a comparable position open in our Estimating Department.

Write or wire for an appointment to discuss these jobs and your qualifications. Our people know of this ad. All inquiries will be held in strictest confidence.

P-4575, Engineering News-Record, Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

HIGHWAY ENGINEERS

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Experienced men, continuous and progressive opportunities as Project Engineers, Group and Squad Leaders. Long range Interstate and Expressway Program.

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Civil Engineers with or without experience in hydraulics, soils, concrete design, contracts estimating, dams or construction for work on flood control projects in Pennsylvania. Salary to $9000. State experience, salary requirements and references.

P-4228—Engineering News-Record
Class. Adv. Div., P. O. Box 12, N. Y. 36, N. Y.

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Young civil engineer interested in broad application of civil engineering.

Excellent opportunity with consulting firm. Liberal benefit plans and good working conditions. Location Middle West.

Send resume of education and experience with salary requirements to:

P-3223, Engineering News-Record
520 No. Michigan Ave., Chicago 11, Ill.

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Capable of organizing and supervising all work for reliable, long established Southern California Company. Duties will include field employment, labor relations, planning and methods, etc. Position is permanent for qualified individual. First reply should state availability, resume, references and salary required. All inquiries will be held in confidence and acknowledged.

P-4418, Engineering News-Record,
68 Post St., San Francisco 4, Calif.

If you're a sales-minded engineer with sanitary experience . . . if you want to practice your profession as a creative individual . . . if challenge, variety and freedom of action appeal to you . . . you'll be interested in the opportunities for sales engineers in Dorr-Oliver.

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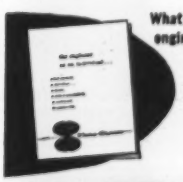
If this specification fits you . . . and most important, if you like the concept of the sales engineer as a creative individual, we would like to hear from you. A letter, collect call or wire to E. E. Johnson, our Director of Personnel at Stamford, Connecticut, is all that's needed. We'll do our best to arrange an interview at your convenience.



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(Continued from page 121)

Plant Engineer. Desires to make a change to a more comfortable climate. Fifteen years heavy experience in top level positions with outstanding firms. Experience in progress and production control, cost analysis, procurement, estimating, high temperature pressure piping design, thermal expansion problems including furnace manifolds, pressure vessel and flange design, welding and weld tests, sanitary waste disposal design, field liaison, supervision, coordination and drafting room practice. Minimum acceptable salary 10,000 dollars per year. Interested parties may secure a resume by writing on company stationery to PW-4447, Engineering News-Record.

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POSITIONS WANTED

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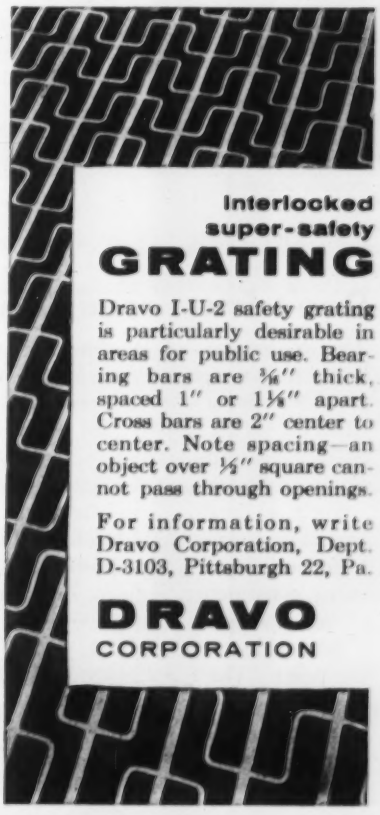

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Bargaining by Professionals

Union membership never has been very popular with engineers. But when they need to have a union—as they do under some circumstances—engineers want to be certain that they do not lose control to non-professionals. For that reason, a recent decision of the U.S. District Court for the District of Columbia is welcome as an aid to engineers in maintaining a professional status in collective bargaining.

The court's decision was in a suit challenging an action of the National Labor Relations Board. The board had placed nine non-professional employees in a voting unit containing over 200 professional employees in the Buffalo plant of Westinghouse Electric Co. without prior approval by members of that unit. The suit was filed by the Buffalo section, Westinghouse Engineers Association. The National Society of Professional Engineers participated in the action as a "friend of the court."

After hearing the case, the District Court set aside the NLRB order and instructed the NLRB to conduct another election confined to the professional group to learn its wishes in the matter. The NLRB plans to appeal the decision, and the NSPE has announced that it will seek to have the Court of Appeals affirm the finding of the District Court.

Superficially it may appear that the voice of nine non-professionals in a group of over 200 professionals would carry little weight; yet on controversial matters, the vote of the non-professionals could be the deciding factor. Consequently, it is important to maintain the right of the professional group to determine what non-professionals are included in its voting unit. The Taft-Hartley Act gave professionals that right. The NLRB should not circumvent the act for its own convenience.

Don't Encourage Disunity

The conference in Washington last week in which homebulders took a serious look at their labor relations problems, put a spotlight on a situation that the construction industry must deal with quickly. The homebuilders are considering their own organization for bargaining with labor.

Such a development—predicted in these columns several years ago—could produce labor relations chaos of large and expensive proportions. It could place the entire construction industry in the unpleasant situation of being whip-sawed over wage demands.

An incident in New York a few years ago illustrates the point. The city's Building Trades Employers Association—one of the oldest and largest of its kind in the U.S.—determined to hold general wage increases to about 15 cents. Most unions went along. The bricklayers did not—and they turned to a very small employers group in one borough, got agreement on a 30 cent wage boost and thus broke the entire employers' front in the city. One result was abandonment of agreements covering two and three year periods that had contributed much to industry stability. This was also no boon for labor groups that had already reached agreements.

The homebuilders say that their many special problems do not get consideration from major contractor negotiating groups, and they are thus saddled with inappropriate wages and working conditions.

Neither management nor labor can permit hard-won stability in labor relations to be destroyed for lack of farsighted action. It is past time for other contractors to sit down with the homebuilders for a thorough, objective study, and to take real steps toward a representative bargaining group. Disunity will help no one.

Additions to the Highway Net

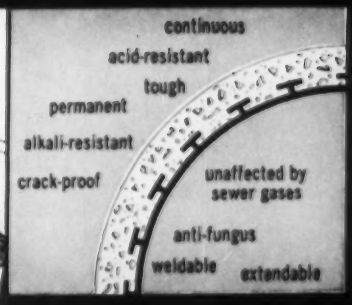
An addition of 1,000 miles to the 40,000 mile Interstate Highway System was authorized by Congress in the Federal-Aid Highway Act of 1956. Determination of where the added mileage is to be located was delegated to the Department of Commerce. To date, state highway departments have proposed additions that total over 12,000 miles, and a flood of bills have been introduced in Congress to add still more mileage to the system.

Congress would do well to heed the caution expressed by Bertram D. Tallamy to the Congressional committee that was considering his nomination for the position of Federal Highway Administrator. Mr. Tallamy said that he has no doubt at all that additional mileage will have to be authorized. But he is not so sure about when the additions should be authorized. He does not want to "open the door" too soon for fear of delaying the whole highway program.

It can be safely assumed that the most urgently needed mileage was included in the 40,000 miles originally designated for the Interstate System. Congress added authorization for an additional 1,000 miles last year to take care of unforeseen developments, such as a need for links between rural main highways and urban expressways.

The fact that the states now have asked for 12,000 additional miles indicates clearly that they are thinking about major extensions of the system, not just minor extensions or missing links. Yet adding 11,000 miles to the mileage already authorized would make for such a large increase in the amount of money that must be provided by Congress as to require reconsideration of the whole financial setup of the program authorized by the 1956 Highway Act. That might cause uncertainties that could seriously delay the big highway program.

To use Mr. Tallamy's expression, this is no time to open the door to changes in the current federal-aid highway program.



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